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NOTES ON FLEAS COLLECTED IN THE PROVINCES OF NOORD-BRABANT AND LIMBURG, THE NETHERLANDS (SIPHONAPTERA)

BY

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ABSTRACT

Twenty three species (954 specimens) of mammal fleas and two species (12 specimens) of bird fleas were taken from 19 species (336 specimens, 174 infested) of mammals. Nine species (2997 specimens) of bird fleas and five species (13 specimens) of mammal fleas were reared from 204 nests (77 infested) of 45 species of birds. All material was collected in the provinces of Noord-Brabant and Limburg, The Netherlands, in 1964.

Fifteen mammal fleas and five bird fleas were found to be new to Noord-Brabant and two mammal fleas and four bird fleas were new to Limburg. Thirteen species of birds and two mammals were added to SMIT's list of hosts for Dutch fleas (SMIT, F. G. A. M., 1962. "Catalogus der Nederlandse Siphonaptera". *Tijdschr. Ent.* 105: 45-96, fig. 1-8). New flea-host-associations were found for 25 flea hosts recorded by SMIT.

The ecology, host and nest specificity, sex ratios and economic importance of fleas are discussed.

Mammal fleas and bird fleas are dealt with separately under their relevant hosts or their nests.

In a synopsis the geographical distribution of all fleas recorded from The Netherlands so far is indicated.

INTRODUCTION

In this paper, which is meant primarily as a report on Siphonaptera collected from mammals and birds' nests taken in the provinces of Noord-Brabant and Limburg, The Netherlands, some *obiter dicta* will also be devoted to host and nest specificity, ecology, sex ratios and economic importance of the fleas recorded, while a synopsis of Dutch fleas and their distribution over provinces will be incorporated in the text.

SMIT (1962a) enumerated 50 species and subspecies of fleas recorded from The Netherlands. Of these 39 are mammal parasites and the remainder have avian hosts. These figures compare well with those for the British Isles whence 16 bird fleas and 40 mammal fleas have been recorded (SMIT, 1957b) and with those known from Denmark where of 53 species and subspecies of fleas recorded by SMIT (1954), 13 are parasitic on birds. The bird flea fauna of Ireland consists of 13 species and subspecies of bird fleas and only 22 mammal fleas (CLAASSENS & O'ROURKE, 1965).

The number of bird fleas occurring in mentioned countries is high as compared with a total of about 100 bird fleas known to occur in the world while the total of described species and subspecies of fleas amounts to nearly 1800.

The difference in the number of bird fleas in the four countries may be due partly to insufficient study, but must also be accounted for by the difference in ecological requirements of some host specific fleas. The species *Ornithopsylla laetitia* Rothschild, occurring on Manx shearwater, *Procellaria puffinus puffinus* Brünnich, and the puffin, *Fratercula arctica grabae* (Brehm), has so far only been recorded from the isles west of the coast of England and Wales, and off the coast of Ireland (SMIT, 1957b). The house-martin fleas, *Frontopsylla (Orfrontia) laeta* (Jordan & Rothschild) and *Callopsylla (Orneacus) waterstoni* (Jordan), have been recorded only from nests of cliff building house-martins, *Delichon urbica* (Linnaeus), in Scotland (ALLAN, 1950; SMIT, 1952), and in Ireland (CLASSENS, 1965a and 1965b). They are further known from Switzerland and the Caucasus (SMIT, 1957a), where they have a very limited recorded distribution.

The relatively poor representation of mammal fleas in these countries is due to the scarcity of mammalian host species. The bird fauna in the same countries is much richer and hence bird fleas have access to a great diversity of hosts and nesting sites, two ecological requirements necessary for different species of fleas to thrive under the given climatic and geological conditions. Phylogenetically, bird fleas are derived from mammal fleas and this secondary evolution together with the wide distribution of many birds may be responsible for the catholic tendencies among bird fleas as regards their adaptive radiation, host specificity and geographical distribution.

Although bird fleas show a lesser degree of monoxenous parasitism than mammal fleas, some are restricted to definite hosts or their nests, but it is difficult to determine, in most cases, whether the nest, or the host in providing the nest, lies at the root of this predilection.

Until 1962 only four bird fleas and eight mammal fleas were recorded from Noord-Brabant (SMIT, 1962a). The fleas of Limburg were fairly well known by that time, especially the bat fleas for the study of which the southern part of this province offers a unique opportunity. Moreover, this part of the country has many geological, floral and faunal peculiarities all of which of necessity lure naturalists of all kind to visit it and discover its secrets.

From the many mammals and birds' nests collected mainly during the months of October, November and December, 1964, the author recovered 23 species of mammal fleas and nine species of bird fleas. Records of 15 mammalian and five bird fleas were found to be new to Noord-Brabant and two of the former and four of the latter were new to Limburg. In the following synopsis of the recorded Dutch fleas all provinces from which a species was reported are given, while the provinces from which new records were made by the author, are marked with an asteric. The abbreviations used for the provinces and islands are as follows: G. = Groningen; F. = Friesland; D. = Drente; O. = Overijssel; Gld. = Gelderland; U. = Utrecht; NH. = Noord-Holland; ZH. = Zuid-Holland; Z. = Zeeland; NB. = Noord-Brabant; L. = Limburg; T. = Texel; V. = Vlieland; Ts. = Terschelling; A. = Ameland; S. = Schiermonnikoog; R. = Rottum.

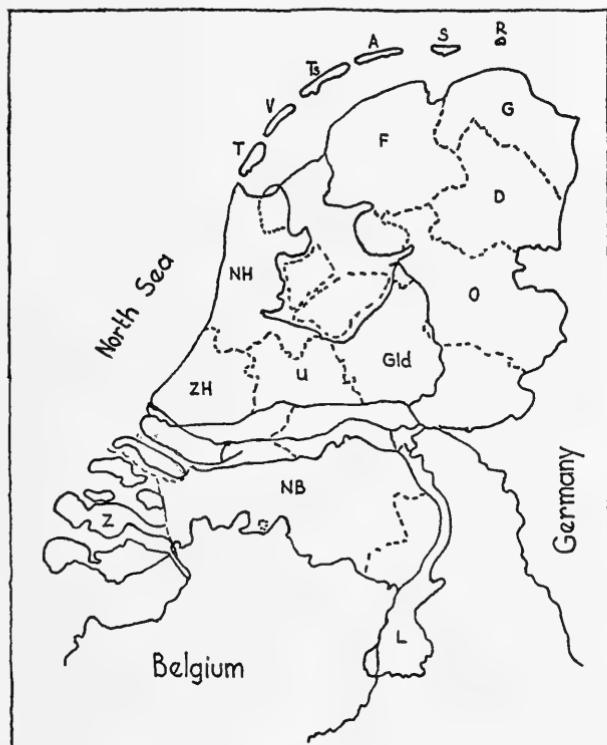
For the exact geographic position of the localities within the provinces from where fleas were recorded, see SMIT (1962a) on whose paper this synopsis is based and whose classification and nomenclature of Siphonaptera are used. The

geographical position of the provinces and islands of The Netherlands is shown in figure.

We collected fleas from the following localities.

Noord-Brabant: Beers, 51.43 N. 5.52 E; Boxtel, 51.35 N 5.20 E; Cuyk, 51.43 N 5.53 E; Goirle, 51.31 N 5.04 E; Grave, 51.45 N 5.46 E; Loon op Zand, 51.38 N 5.05 E; Mill, 51.41 N 5.49 E; Oisterwijk, 51.35 N 5.12 E; Schayk, 51.44 N 5.28 E; St. Hubert, 51.40 N 5.50 E; St. Michiels Gestel, 51.38 N 5.21 E; Stra-brechtsche heide, 51.25 N 5.39 E; Tilburg, 51.33 N 5.07 E; Vught, 51.39 N 5.18 E; Wanroy, 51.39 N 5.49 E.

Limburg: Schinnen, 50.57 N 5.53 E; Venlo, 51.22 N 6.10 E; Venray, 51.32 N 5.58 E.



Provinces and islands of The Netherlands

SYNOPSIS OF THE KNOWN DISTRIBUTION OF DUTCH FLEAS

HYSTRICHOPSYLLIDAE

Hystrichopsyllinae

Hystrichopsylla (*Hystrichopsylla*) *talpae talpae* (Curtis, 1826), F. O. Gld. U. NH. ZH. Z. NB. L.

Typhloceras poppei Wagner, 1903, F. Gld. U. NH. *NB. L.

Doratopsyllinae

Doratopsylla dasycnema dasycnema (Rothschild, 1897), Gld. *NB. *L. Ts.

Ctenophthalminae

Palaeopsylla soricis soricis (Dale, 1878), F. O. Gld. U. ZH. *NB. L. Ts.

Palaeopsylla minor (Dale, 1878), F. O. Gld. U. NH. ZH. Z. NB. L.

Ctenophthalmus (Ctenophthalmus) bisoctodentatus heselhausi (Oudemans, 1914),
G. O. Gld. NH. ZH. Z. NB. L.

Ctenophthalmus (Ctenophthalmus) agyrtes agyrtes (Heller, 1896), G. F. D. O.
Gld. T. Ts. S.

Ctenophthalmus (Ctenophthalmus) agyrtes smitianus Peus, 1950, Gld. U. NH.
ZH. Z. NB. L.

Ctenophthalmus (Euctenophthalmus) assimilis (Taschenberg, 1880), G. F. Gld.
U. NH. ZH. Z. *NB. L.

Ctenophthalmus (Euctenophthalmus) congener congener Rothschild, 1907, G.
O. Gld. *NB. L.

Rhadinopsyllinae

Rhadinopsylla (Actenophthalmus) pentacantha (Rothschild, 1897), F. *NB. L.

Rhadinopsylla (Actenophthalmus) isacantha continentalis Smit, 1957, Gld.

LEPTOPSYLLIDAE

Leptopsyllinae

Leptopsylla segnis (Schönherr, 1811), G. F. Gld. U. NH. ZH. *NB. L

Peromyscopsylla silvatica (Meinert, 1896), Gld. *NB. *L.

ISCHNOPSYLLIDAE

Ischnopsyllinae

Ischnopsyllus (Ischnopsyllus) elongatus (Curtis, 1832), Gld. NH. ZH. *NB.

Ischnopsyllus (Ischnopsyllus) intermedius (Rothschild, 1898), F. O. NH. ZH. L.

Ischnopsyllus (Ischnopsyllus) octactenus (Kolenati, 1856), Gld. U. NH. ZH.
*NB. L.

Ischnopsyllus (Ischnopsyllus) simplex simplex Rothschild, 1906, L.

Ischnopsyllus (Ischnopsyllus) simplex myticus Jordan, 1942, L.

Ischnopsyllus (Ischnopsyllus) variabilis (Wagner, 1898), L.

Ischnopsyllus (Hexactenopsylla) hexactenus (Kolenati, 1956), G. Gld. U. ZH.
*NB. L.

Rhinolophopsylla unipectinata unipectinata (Taschenberg, 1880), L.

Nycteridopsylla eusarca Dampf, 1908, Gld.

Nycteridopsylla longiceps Rothschild, 1908, U. ZH. L.

Nycteridopsylla pentactena (Kolenati, 1856), O. Gld. U. ZH. L.

CERATOPHYLLIDAE

Ceratophyllinae

Paraceras melis melis (Walker, 1856), Gld.*Tarsopsylla octodecimdentata octodecimdentata* (Kolenati, 1863), O. Gld.*Dasypsyllus gallinulae gallinulae* (Dale, 1878), Gld. NH. ZH. NB. L.*Nosopsyllus fasciatus* (Bosc, 1800), G. F. Gld. U. NH. ZH. NB. L.*Malaraeus (Amalaraeus) penicilliger mustelae* (Dale, 1878), Gld.*Megabothris turbidus* (Rothschild, 1909), G. F. D. O. Gld. ZH. *NB. L.*Megabothris walkeri* (Rothschild, 1902), Gld.*Monopsyllus sciurorum sciurorum* (Schrank, 1803), D. O. Gld. U. NH. ZH. NB. L.*Ceratophyllus birundinis* (Curtis, 1826), G. Gld. NH. ZH. Z. *NB. *L.*Ceratophyllus rusticus* Wagner, 1903, G. NH. Z. *NB. *L.*Ceratophyllus farreni farreni* Rothschild, 1905, G. Gld. NH. Z. *NB. *L.*Ceratophyllus styx styx* Rothschild, 1900, F. O. NB. L.*Ceratophyllus gallinae gallinae* (Schränk, 1803), F. D. O. Gld. U. NH. ZH. Z. NB. L.*Ceratophyllus fringillae* (Walker, 1856), Gld. NH. ZH. Z. *NB. L.*Ceratophyllus rossittensis rossittensis* Dampf, 1903, NH.*Ceratophyllus columbae* (Gervais, 1844), Gld. NH. ZH. *NB. L.*Ceratophyllus garei* Rothschild, 1902, Gld. NH. ZH. NB. Z. *L.*Ceratophyllus borealis* Rothschild, 1907, ZH.

VERMIPSYLLIDAE

Chaetopsylla (Chaetopsylla) globiceps (Taschenberg, 1880), Gld. L.*Chaetopsylla (Chaetopsylla) trichosa* Kohaut, 1903, Gld. L.

PULICIDAE

Spilopsyllinae

Spilopsyllus cuniculi (Dale, 1878), D. O. Gld. U. NH. ZH. *NB. L.

Archaeopsyllinae

Ctenocephalides canis (Curtis, 1826), Gld. U. NH. ZH. *NB. L. Ts.*Ctenocephalides felis felis* (Bouché, 1835), O. Gld. U. NH. ZH. *NB. L. Ts.*Archaeopsylla erinacei erinacei* (Bouché, 1835), Gld. U. NH. ZH. Z. NB. L.

Pulicinae

Pulex irritans Linnaeus, 1758, F. O. Gld. U. NH. ZH. NB. L. Ts.

MATERIAL AND METHODS

Trapping of mice, voles and shrews was done with eight live traps constructed of wire netting which, though very efficient for catching small mammals proved less dependable as regards keeping the animals alive. All traps were baited with cheese and checked every morning from October 4th until December 15th, 1964. Six traps made of wood were used in our house and garden. These were also baited with cheese and checked at regular intervals every day from June 15th until December 15th, 1964. All animals trapped in and near our house were collected alive. Three pygmy shrews, *Sorex minutus* Linnaeus, and one common shrew, *Sorex araneus* Linnaeus, were captured in jars used as pitfalls at Koningshoeven, Tilburg.

All catches dead or live were put in separate polythene bags and, if necessary, killed from the outside before they were searched for fleas. Five or six white-toothed shrews, *Crucidura russula* (Hermann), caught in our garden at Tilburg were anaesthetized with ether before ectoparasites were removed from them. They were marked at the ears and released to be recaptured.

Rats were killed in and near farms and farm out-houses. Moles were collected in gardens and meadows. Squirrels, polecats, weasels and stoats were examined in a taxidermist's workshop at Oisterwijk. The taxidermist put all incoming animals in polythene bags and stored them in a deepfreeze until they were examined by the author. Three squirrels were shot by the author on the estate Villa Blanca, Goirle. These squirrels appeared to harbour the largest number of fleas per individual host in the present investigation.

Some mammal fleas were also collected from birds' nests while some bird fleas were recovered from the bodies of mammals especially of animals of prey.

Each animal was carefully searched for fleas and other ectoparasites by putting the contents of each bag into a deep white bowl and by brushing and blowing against the grain of the fur to remove parasites that had stayed on the dead hosts.

Bird fleas were collected from nests taken in the field. Only those nests of which the origin was certain were kept for incubation. Several bird watchers and foresters were of great help by showing nests of birds known to them.

The nests were put in separate polythene bags and kept at room temperature (18° C) for seven days. They were then carefully searched for fleas. The author is well aware of the fact that the nest material should have been kept for a longer period in order to obtain the maximum number of parasites that could possibly be bred from the pupae and maybe the larvae present. The shorter method was followed because of lack of time and space.

Often fleas were seen moving up the inside walls of the bags within a day or two. This happened always when a nest harboured many fleas. In such cases the contents of the bags were searched earlier, preferably daily, in order to prevent loss of fleas by drowning in the moisture accumulating on the inside walls of the bags. Sometimes fleas were seen in the nesting material directly after collection but usually they were not seen before incubation.

Fleas were picked up with a Leonhard forceps and stored in 70% alcohol until they were prepared for identification. The techniques used to mount the fleas

were those described by SMIT (1957a) whose keys were also used for identification of the insects (SMIT, 1954, 1957a, 1962a). For nomenclature of the mammals and the birds we followed BRINK (1955), and DOBBEN (1963), respectively.

RESULTS AND DISCUSSION

A. MAMMALS

In the discussion under every mammal or group of mammals some incidental remarks will be devoted to ecology and host specificity of the fleas occurring on them. The reader is advised also to read SMIT (1962a) who gave a detailed account of every species of flea and a complete synopsis of "Host-flea-associations" recorded from The Netherlands until 1962.

SORICIDAE

Sorex minutus Linnaeus, the pygmy shrew. Tilburg, XI.1964—1 ♂, 2 ♀; 1 ♂, 1 ♀ infested. Fleas: *D. d. dasycnema* : 1 ♂; *P. s. soricis* : 1 ♂, 1 ♀.

Sorex araneus Linnaeus, the common shrew. Tilburg, X.1964 — 3 ♂, 4 ♀; 1 ♂, 1 ♀ infested. Fleas: *D. d. dasycnema* : 1 ♀; *P. s. soricis* : 2 ♂, 1 ♀; *C. b. beselhausi* : 1 ♂, 1 ♀.

Mill, XI.1964 — 1 ♂, 1 ♀; both infested. Fleas: *D. d. dasycnema* : 6 ♂, 3 ♀. Vught, XII.1964 — 1 ♂, 1 ♀; 1 ♂ infested. Fleas: *D. d. dasycnema* : 1 ♂; *P. s. soricis* : 1 ♂.

Venlo, XII.1964 — 2 ♂; one infested. Fleas: *D. d. dasycnema* 1 ♂, 2 ♀; *P. s. soricis* : 1 ♀.

Crucidura russula (Hermann), the common European white-toothed shrew. Tilburg, XI.1964 — 2 ♂, 4 ♀; 1 ♂ infested. Fleas: *N. fasciatus* : 1 ♀.

Goirle, X.1964 — 1 ♂ examined and found infested. Fleas: *D. d. dasycnema* : 1 ♂, 1 ♀.

Oisterwijk, XII.1964 — 1 ♂, 1 ♀; 1 ♀ infested. Fleas: *P. s. soricis* : 1 ♂; *N. fasciatus* : 1 ♂, 1 ♀; *H. t. talpae* : 1 ♀.

Trapping of shrews was described in "Material and methods". All shrews caught in this way were found dead in the traps except for six shrews recorded from our garden at Tilburg. Pygmy shrews were trapped in pitfalls, which were not baited and in which the shrews were found dead. Of all fleas collected from the Soricidae examined, 55% were *D. d. dasycnema* and 26% *P. s. soricis*.

Palaeopsylla soricis soricis and *Doratopsylla dasycnema dasycnema* are host specific parasites of shrews. The latter species is a nest parasite and according to SMIT (1962a) this may be one of the reasons why the species has not been collected much in the past. Moreover, shrews tend to harbour few fleas per individual host. Of the two specimens of *S. araneus* recorded from Mill the female carried seven specimens of *D. d. dasycnema*, an infestation worth recording. Remarkable is also that on the bodies of the hosts male specimens of this flea are more abundant than females. SMIT (1962a) commented that the sex ratio is nearly

2:1 in favour of the males. Our figures agree very well with SMIT's observations.

Although *P. s. soricis* is a body flea rather than a nest dweller, we found few specimens of this species on the hosts examined.

C. b. heselhausi is a host specific mole flea and is particularly found in moles' nests. Shrews are recorded as accidental hosts for this flea as well as for the rat flea, *N. fasciatus*. Shrews are secondary hosts for the flea *H. t. talpae*. *N. fasciatus* has not been recorded before from shrews in The Netherlands, but SMIT (1957b) recorded it from *S. araneus* in the British Isles. SMIT (1962a) lists ten species of fleas found in association with shrews.

Crocidura russula was collected from live traps set out in three different localities. Unfortunately the specimens from our garden harboured only one *N. fasciatus* and no other species of fleas. Five of the six white-toothed shrews from the garden were marked and released. These were all recaptured sometimes twice a day for about a week. After that time they seemed to have disappeared from our garden where they had suddenly turned up. We had hoped to see whether *C. russula*, which occupied the same shelter places as *Mus musculus*, was liable to become infested with *Leptopsylla segnis*, the house-mouse flea, or possibly with other fleas that might have straggled into our garden on passing mammals. Although many house-mice were trapped, few were found infested and straggling onto *C. russula* did not occur, at least not during the short time we were able to recapture them.

All fleas, except *H. t. talpae*, recorded from *C. russula* examined by us are new host records.

Sorex minutus has not been recorded before as a host for fleas in this country and hence all species of fleas reported from them at Tilburg are new records. Our attempts to catch water shrews, *Neomys fodiens* Pennant, near ditches and ponds failed, nor did we succeed in trapping the bicolour white-toothed shrew, *Crucidura leucodon* (Hermann), which may occur in Noord-Brabant. No fleas have so far been recorded from *C. leucodon* in The Netherlands.

TALPIDAE

Talpa europaea Linnaeus, the mole.

Loon op Zand, X.1964 — 1 ♂, 1 ♀; 1 ♀ infested. Fleas: *P. minor* : 1 ♂, 2 ♂; *C. a. smitianus* : 1 ♂, 1 ♀.

St. Michiels Gestel, X.1964 — 1 ♂ examined and found infested. Fleas: *P. minor* : 1 ♀; *C. a. smitianus* : 1 ♂ 1 ♀; *H. t. talpae* : 1 ♀.

Mill, XII.1964 — 2 ♂, 1 ♀, all infested. Fleas: *P. minor* : 5 ♂, 3 ♀.

Tilburg, X.1964 — 2 ♂, 1 ♀; 1 ♂, 1 ♀ infested. Fleas: *P. minor* : 3 ♂, 3 ♀; *C. a. smitianus* : 1 ♂, 2 ♀; *P. s. soricis* : 1 ♂.

Vught, X.1964 — 2 ♂, 1 ♀, all infested. Fleas: *P. minor* : 4 ♂, 4 ♀; *C. a. smitianus* : 2 ♂, 3 ♀; *H. t. talpae* : 1 ♂; *M. turbidus* : 1 ♀.

SMIT (1962a) lists two host specific mole fleas, four secondary and nine accidental "flea-mole-associations". Of all fleas collected from moles by us, 62% belonged to the species *P. minor*. *C. a. smitianus* and *H. t. talpae* are often

found on moles, but they constitute only a secondary host-relationship. *M. turbidus* being a host specific vole flea must be regarded as a straggler when occurring on moles. *P. s. soricis*, a host specific shrew flea may also straggle onto moles. *C. b. heselhausi*, the second specific mole flea is a nest dweller and this may explain why it was not found by us. The host specificity of *P. minor* and *C. b. heselhausi* was well demonstrated by SMIT (1962b), who found that of the 13,330 fleas collected from 1,005 moles and 45 moles' nests at Wilp, Gelderland, The Netherlands, during a period of eleven years 90% of all fleas recovered from the moles and only 4.6% of all specimens retrieved from the nests were *P. minor* while 65.5% of all fleas taken from the nests and only 2.4% of all fleas gathered from the hosts were *C. b. heselhausi*. In Noord-Brabant *C. b. heselhausi* was recorded from Breda, where it was found in a mole's nest (SMIT, 1962a). We record it from *S. araneus* at Tilburg.

MURINAE

Apodemus sylvaticus (Linnaeus), the long-tailed field mouse.

Goirle, X—XI.1964 — 3 ♂, 5 ♀; 1 ♂, 3 ♀ infested. Fleas: *C. a. smitianus*: 2 ♂, 3 ♀.

Mill, XI.1964 — 6 ♂, 4 ♀; 5 ♂, 2 ♀ infested. Fleas: *T. poppei*: 9 ♂, 3 ♀; *C. a. smitianus*: 2 ♂, 2 ♀; *M. turbidus*: 2 ♂, 1 ♀; *N. fasciatus*: 2 ♀.

Oisterwijk, X.1964 — 4 ♂, 4 ♀; 1 ♂, 1 ♀ infested. Fleas: *C. a. smitianus*: 1 ♂, 1 ♀; *M. turbidus*: 1 ♂, 1 ♀.

Tilburg, X—XI.1964 — 9 ♂, 5 ♀; 4 ♂, 4 ♀ infested. Fleas: *T. poppei*: 2 ♂, 2 ♀; *C. a. smitianus*: 1 ♂, 2 ♀; *M. turbidus*: 1 ♀.

Venlo, XII.1964 — 3 ♂, 1 ♀; 1 ♂, 1 ♀ infested. Fleas: *T. poppei*: 2 ♂, 1 ♀; *C. a. smitianus*: 1 ♀; *N. fasciatus*: 2 ♀; *C. g. gallinæ*: 1 ♂.

A. sylvaticus is a very common mammal in The Netherlands where it inhabits nearly all terrestrial biotopes. It is the mammal par excellence for the study of fleas of small mammals occurring in an area because it attracts the great majority of species of mammal fleas, even those of which other small mammals are the principal hosts. The author found it possible to predict what species of mammals could be expected in a given area after examining a small number of flea-infested field mice. It was also found that mammals other than field mice were caught only after part of the population of the latter occurring around the spot where traps were set out had been trapped. This was also true for the bank vole, *Clethrionomys glareolus*, which as a rule enters traps before *A. sylvaticus*, whenever these two species share a habitat. *C. glareolus* is to some extent also a diurnal mammal and may therefore seem to be easier caught than *A. sylvaticus*. The common shrew, *Sorex araneus*, was never trapped before field mice and bank voles were captured. Although mice, voles and shrews live in close proximity, they seem to avoid each other in the open. It is therefore a good practice to leave traps for three or four consecutive days on the same spot rather than to keep moving them from one place to another after every night.

Many species of fleas have been found in association with field mice. Most of these relationships are of a secondary or accidental nature. *Typhloceras poppei* and

Ctenophthalmus agyrtes subspecies are regarded as the principal Siphonaptera found in association with this mammal. *Megabothris turbidus* appeared to be fairly common on the mice examined, but SMIT (1962a) regards *A. sylvaticus* as an accidental host for this flea, which has the bank vole, *C. glareolus*, for its principal host. Three specimens, two males and one female, of the subspecies *H. t. talpae* were found on a female field mouse caught on the estate Villa Blanca, Goirle. This mouse also carried one specimen of the subspecies *C. a. smitianus*. The record of the *Apodemus*—*H. t. talpae* association is new to The Netherlands (see discussion under *C. glareolus*). The occurrence of *Palaeopsylla minor*, a mole flea, on *Apodemus* is also a new host record. *N. fasciatus*, the rat flea, may often be found on small mammals whenever they share the same territory with rats so that exchange of fleas and other ectoparasites can easily be accomplished.

The bird flea *Ceratophyllus g. gallinae* was found on several mammals during our survey. This flea will feed on mammals when hungry, but its association with mammalian hosts must be regarded as accidental.

Special attention was paid as to whether the beetle *Leptinus testaceus* Müller (Col., Silphidae) occurred on *A. sylvaticus* or on any other small mammal or in birds' nests in Noord-Brabant and Limburg, but no specimen was found. The beetle was frequently found on field mice in Ireland (FAIRLEY, 1963b; CLAASSENS & O'ROURKE, 1964) and in Great Britain (J. BALFOUR BROWNE, British Museum, Natural History, personal communication). FAIRLY (1963b) reported that 15% of male and 4% of female *Apodemus* (138 specimens) taken in Co Down, Ireland, in October and November, 1962, harboured this beetle. We examined 109 field mice in Co Cork, Ireland, and found 12% of the males and 13% of the females infested with this beetle (CLAASSENS, 1964). KEER (1930) reported this beetle from The Netherlands as occurring on field voles, *Microtus arvalis*, on rats and long-tailed field mice. SMIT (personal communication) found it on *A. sylvaticus* in various parts of The Netherlands.

The beetle, which has also been recorded from nests of *A. sylvaticus* (O'MAHONY, 1945, 1947), from birds' nests (RYE, 1890; JOHNSON & HALBERT, 1902; LINSSEN, 1959; and CLAASSENS, 1964) and from the nests of *Bombus terrestris* (CUMBER, 1949), may also be found in rotten wood (LINSSEN, 1959) and in dead leaves (RYE, 1890). *L. testaceus* can be recognized by the long filiform antennae, and the absence of eyes. It is oval, small, 2 mm, very flattened, and dull testaceous in colour. It is still a matter of speculation as to whether the beetle has a parasitic, nidicolous or phoretic association with *A. sylvaticus*.

Rattus norvegicus (Berkenhout), the brown rat.

Cuyk, XII.1964 — 2 ♂, 3 ♀; 1 ♂, 1 ♀ infested. Fleas: *N. fasciatus* : 3 ♂, 5 ♀; *C. a. smitianus* : 2 ♂, 2 ♀.

Oisterwijk, XI.1964 — 3 ♂, 2 ♀; 2 ♂, 1 ♀ infested. Fleas: *N. fasciatus* : 1 ♂, 1 ♀; *C. a. smitianus* : 3 ♂, 2 ♀; *L. segnis* : 1 ♀.

Tilburg, XI.1964 — 1 ♂, 1 ♀, both infested. Fleas: *N. fasciatus* : 2 ♂, 3 ♀; *C. a. smitianus* : 1 ♂, 1 ♀; *C. b. beselhausi* : 1 ♂.

Venray, XII.1964 — 1 ♂, 2 ♀; 1 ♂, 1 ♀ infested. Fleas: *N. fasciatus* : 1 ♂, 4 ♀; *C. a. smitianus* : 1 ♂, 1 ♀.

Although the black rat, *Rattus rattus* (Linnaeus), and the brown rat, *R. norvegicus*,

cus, occur in Noord-Brabant and Limburg, only the brown rat of more frequent occurrence was obtained during our survey. The abundance of the brown rat may be illustrated by some recent figures. A poultry farmer at Mill killed 407 rats in one day in a hen house (November, 1964); another caught 173 rats in one hen house also in one day (October, 1964) and a farmer at Tilburg killed 77 rats in October, 1964, also in a hen house. Many rats are killed too by poisoned bait; it is impossible to determine how many rats are killed daily by this method.

In addition to the damage they do to property of all kind, rats are vectors of diseases which they may disseminate to domestic animals and even to man. Some of these diseases are transmitted by ectoparasites, most important of which are the fleas.

Our observations revealed a predominance of *N. fasciatus* infestations on the rats examined. Although *N. fasciatus* is the common rat flea, it need not always be the predominant species of flea on rats in any area in Europe. CLAASSENS & O'ROURKE (1965) reported that of sixteen rats collected from four counties in Ireland only two carried *N. fasciatus* exclusively while all others were infested both with *N. fasciatus* and *Ctenophthalmus nobilis* (subspecies), or only with *C. nobilis* (subspecies). Of a total of 54 fleas collected from the 16 rats ten were *N. fasciatus* and all the other were either *C. nobilis nobilis* (Rothschild, 1898) or *C. n. vulgaris* Smit, 1955. Further investigations would be of interest. There may exist an inter-specific competition between the species of the genus *Nosopsyllus* and those of the genus *Ctenophthalmus* when these species occur on rats occupying the same area.

Although SMIT (1962a) listed nine species of fleas as being reported from brown rats in The Netherlands, we found only four, two of which were single specimens.

For the economic importance of rat fleas see the chapter on domestic and medical importance of fleas in this paper.

Mus musculus Linnaeus, the house mouse. Taken from our garden and house situated just outside the city boundary of Tilburg. Trapping of these mammals was started June 15th, and continued until December 15th, 1964. All mice were collected alive from the traps. The greater part (17 of 27 specimens) captured indoors were killed with a stick because they refused to enter traps. All other mice were caught in live traps baited with cheese. Mice of the outdoor population were grey brown on top and grey underneath while members of the indoor population had back and underside grey. Some of the mice killed indoors during November and December obviously belonged to the outdoor population.

Most of the mice were trapped near a small dump and in an aviary where they appeared to congregate after arriving in the garden. Trapping was started in June, but until September 15th only four mice were captured in the garden and three of these harboured fleas, while of the many mice obtained later very few fleas were recovered. Six shrews were also obtained from near the dump. For shrews see under Soricidae in this paper.

In table I details are given concerning the mice examined and their flea population. All mice taken during four weeks are put together in order to show the change in population density both of mice and their epi-fauna, as well as to demonstrate that species of fleas other than *Leptopsylla segnis* were removed only from those mice which visited our garden after August.

TABLE I. Fleas of *Mus musculus* Linnacus

Details of the hosts		Details of flea population													
DATE	LOCALITY	Number of mice examined		Number of mice infected		Leptopsylla		Ctenophthalmus smitjanus		Nosopsyllus fasciatus		Megabothris turbidus		Total of fleas	
1964	Tilburg	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀		
June 15th.	indoors	1	3	1	2	7	10					7	10		
July 15th.															
July 16th.	indoors	2	1	1	1	4	5					4	5		
	outdoors	1		1		2	2					2	2		
August 15th.	indoors	3	5	2	2	4	7					4	7		
August 16th.	indoors	1	2	1	1	1	1	1	0			2			
Sept. 15th.	outdoors	2	2	1	2	5	4					5	4		
Sept. 16th.	indoors	2	1	0	1							1			
Oct. 15th.	outdoors	2	0	2	0	3	4					3	4		
Oct. 16th.	indoors	22	13	4	1	2	1	1	1	1	0	4	2		
Nov. 15th.	outdoors											5	8		
Nov. 16th.	indoors	4	2	3	2	5	8					2	3		
Dec. 15th.	outdoors	12	5	1	1	2	2	0	1						
Total nos.....		52	34	17	13	35	43	2	1	1	1	10	39 45		

Of the outdoor population (38 ♂ and 21 ♀) only 16% of ♂ and 19% of ♀ were infested with fleas, while of the indoor mice (14 ♂ and 13 ♀) and 70% and 70%, respectively, were infested. The remarkable difference may be explained by the fact that mice travelling from one place to another lose their ectoparasites. When searching for winter quarters mice may spend only a short time in the same hiding place and fleas which stay on the host only for a limited time to feed, are left behind.

Of the outdoor mice taken in August three of four specimens were infested, but two of these carrying fleas may have belonged to the local population of the garden where a stock of fleas may have been built up in their usual hiding places. The big invasion of mice took place during November, when 41 specimens were trapped. The last mouse was caught in the garden on December 10th. Trapping was continued until January 10th but not a single mouse could be trapped. Yet mice were sometimes seen during day-time. They seemed to have established a definite abode and as a result they might have regained their timidity and shyness. One female mouse was caught in the house on December 22nd, but it harboured no fleas.

The great predominance in the outdoor population of males over females is worth noticing. It would be of considerable interest to repeat such studies preferably during a longer period and with the aid of more traps.

It is the right place here to express sincere thanks to Messrs. H. VAN DER ZANDE and H. SOETENS who were of indispensable help in catching the specimens of *Mus musculus*.

MICROTINAE

Clethrionomys glareolus Schreber, the bank vole.

Goirle, X.1964 — 2 ♀, none infested.

Mill, XI.1964 — 2 ♂, 2 ♀; 1 ♂, 2 ♀ infested. Fleas: *C. a. smitianus* : 7 ♂, 6 ♀; *M. turbidus* : 1 ♀; *N. fasciatus* : 1 ♀.

Oisterwijk, X.1964 — 2 ♂, 1 ♀; 1 ♂, 1 ♀ infested. Fleas: *C. a. smitianus* : 1 ♂, 1 ♀; *M. turbidus* : 1 ♂.

Tilburg, X—XII.1964 — 11 ♂, 10 ♀; 10 ♂, 10 ♀ infested. Fleas: *P. silvatica* : 4 ♂, 7 ♀; *C. a. smitianus* : 10 ♂, 8 ♀; *M. turbidus* : 1 ♂, 3 ♀; *C. c. congener* : 2 ♂, 3 ♀; *H. t. talpae* : 1 ♂, 1 ♀; *R. pentacantha* : 1 ♀.

Venlo, XII.1964 — 3 ♂, 3 ♀; 2 ♂, 1 ♀ infested. Fleas: *P. silvatica* : 3 ♂, 2 ♀; *C. a. smitianus* : 1 ♂; *M. turbidus* : 1 ♂, 1 ♀; *C. c. congener* : 1 ♀.

Though less common in some areas than the long-tailed field mouse, the bank vole is widely spread throughout The Netherlands. It avoids wet places and has a preference for deciduous woodlands, hedges, shrubs, edges of woods and may also occur in coniferous forests.

Ctenophthalmus agyrtes subspecies, *C. congener congener*, *Peromyscopsylla silvatica* and *Megabothris turbidus* are the principal fleas of *C. glareolus* in this country. With the exception of the subspecies *C. agyrtes* all these Siphonaptera were recovered from the bank voles examined. According to SMIT (1962a), *C. glareolus*

is a secondary host for *C. a. smitianus*, but it was by far the most common species on the bank voles examined by us. For the geographical distribution of *C. a. agyrtes* and *C. a. smitianus* in The Netherlands see the synopsis of Dutch fleas in this paper and also SMIT (1962a).

H. t. talpae is a nest flea but it has been also found regularly on the bodies of mice, voles, moles and shrews. It is difficult therefore to determine the principal host of this largest of the European fleas. In Ireland *H. t. talpae* was often found on *A. sylvaticus* (FAIRLEY, 1963a; CLAASSENS & O'ROURKE, 1965). Moles are absent from Ireland and 18 voles, *C. glareolus*, examined there were not infested with this flea. For the discovery of the bank vole in Ireland see CLAASSENS & O'GORMAN (1965). The occurrence of *N. fasciatus* on the bank vole is accidental, while the common bird flea, *Ceratophyllus g. gallinae*, is merely a straggler.

Rhadinopsylla pentacantha is usually found in association with *A. sylvaticus*. Its occurrence on *C. glareolus* is a new host record for The Netherlands. The record of *P. silvatica* is the second for The Netherlands. We took it also from a weasel, *Mustela nivalis*, shot at Oisterwijk. This Leptopsyllid mammal flea had been recorded before from Oldebroek (Gld.) where it was found on *C. glareolus* (SMIT, 1962a). SMIT commented that *P. silvatica* is not a very common parasite of voles but it has a wide distribution in Europe and a closely related subspecies, *P. silvatica spectabilis* (Rothschild, 1898) occurs in Great Britain and Spain.

Microtus arvalis Pallas, the common vole.

Cuyk, XII.1964 — 6 ♂, 8 ♀; 4 ♂, 4 ♀ infested. Fleas: *C. assimilis* : 3 ♂, 5 ♀; *C. a. smitianus* : 1 ♂, 3 ♀; *N. fasciatus* : 1 ♀.

Grave, XII.1964 — 5 ♂, 3 ♀; 3 ♂, 2 ♀ infested. Fleas: *C. assimilis* : 1 ♂, 1 ♀; *C. a. smitianus* : 1 ♂; *H. t. talpae* : 1 ♂.

Few fleas from the common vole, *M. arvalis*, have so far been examined. Special attempts were therefore made to catch these mammals. Although only four species of fleas on voles were found, the general trend of their flea infestation was well shown.

C. assimilis was the flea most commonly found on the 13 voles infested (59% of all fleas collected from them). *C. assimilis* is a host specific flea of the common vole (SMIT, 1962a). It appears to be a nest flea and is not often found in big numbers on the bodies of the hosts.

MUSTELIDAE

Mustela putorius (Linnaeus), the pole cat.

Oisterwijk, X—XI.1964 — 7 ♂, 5 ♀; 2 ♂, 1 ♀ infested. Fleas: *M. s. sciurorum* : 1 ♂; *A. e. erinacei* : 1 ♀; *C. a. smitianus* : 1 ♂; *C. garei* : 1 ♂, 1 ♀.

Boxtel, X—XI.1964 — 5 ♂, 5 ♀; 1 ♂, 1 ♀ infested. Fleas: *C. a. smitianus* : 1 ♂; *C. g. gallinae* : 1 ♂.

Venray, X.1964 — 1 ♂ examined and found infested. Fleas: *M. s. sciurorum* : 1 ♂.

Mustela erminea Linnaeus, the stoat.

Oisterwijk, X—XI.1964 — 2 ♂, 1 ♀; 1 ♂ infested. Fleas: *M. s. sciurorum* : 1 ♂, 1 ♀; *C. garei* : 1 ♂.

Boxtel, XI.1964 — 1 ♂, 1 ♀; 1 ♂ infested. Fleas : *C. garei* : 1 ♀.

Mustela nivalis Erxleben, the weasel.

Oisterwijk, X—XI.1964 — 2 ♂, 2 ♀; 1 ♀ infested. Fleas : *A. e. erinacei* : 1 ♂, 2 ♂; *C. a. smitianus* : 1 ♀; *P. silvatica* : 1 ♂.

Mustela lutreola (Linnaeus) the european mink.

Tilburg, XI.1964 — nine nests examined, one infested. Fleas: *C. a. smitianus* : 2 ♂, 1 ♀.

The carnivores listed above are not usually infested with fleas. They acquire these parasites by preying upon small mammals and birds. SMIT (1962a) lists several species of fleas recorded from these mammals, but the records of *C. a. smitianus*, *P. silvatica* and the bird fleas, *C. garei* and *C. g. gallinae*, are new to The Netherlands. Minks were never recorded before as accidental hosts for Siphonaptera in this country. We have investigated only some nests of these mammals when nest boxes were taken out of the cages on a mink farm. The mink farm was situated in a forest and fleas from the long-tailed field mouse or from the common shrew may have straggled onto these unusual hosts and from them into the nesting material.

C. a. smitianus was found most often on the carnivores examined. This is of course not surprising since many small mammals harbour this flea. Squirrel fleas were found on pole cats and stoats, but this is not unusual either, because squirrels abound in all areas where Mustelidae were captured.

SCIURIDAE

Sciurus vulgaris Linnaeus, the red squirrel.

Goirle, X—XI.1964 — 1 ♂, 2 ♀, all infested. Fleas: *M. s. sciurorum* : 55 ♂, 64 ♀; *C. g. gallinae* : 1 ♂, 1 ♀; *C. garei* : 1 ♀.

Oisterwijk, X—XI.1964 — 9 ♂, 6 ♀, 8 ♂, 6 ♀ infested. Fleas: *M. s. sciurorum* : 121 ♂, 113 ♀; *C. g. gallinae* : 1 ♀.

Boxtel, X.1964 — 3 ♂, 2 ♀, all infested. Fleas: *M. s. sciurorum* : 33 ♂ and 44 ♀; *C. garei* : 1 ♂.

Vugt, XI.1964 — 1 ♂ examined and found infested. Fleas: *M. s. sciurorum* : 1 ♂, 4 ♀.

Venray, X.1964 — 1 ♂, 1 ♀, both infested. Fleas: *M. s. sciurorum* : 78 ♂, 89 ♀.

Wanroy, XI.1964 — one nest. Fleas: *M. s. sciurorum* : 15 ♂, 19 ♀.

Beers, XI.1964 — two nests. Fleas: *M. s. sciurorum* : 12 ♂, 17 ♀.

The red squirrel, *Sciurus vulgaris*, is very common in most wooded areas in The Netherlands. Many specimens are shot every year in an attempt to keep their numbers in check and to decrease the damage done to the forests and bird fauna. Lack of natural predators, especially martens and wild cats made interference of man necessary. It is of interest to recall the records of the squirrel flea, *Monopsyllus sciurorum*, from the pole cat and stoat. These Mustelidae as well as the weasel appear to prey upon squirrels, but they seem to have little effect on the squirrel population.

M. s. sciurorum is the most common host specific squirrel flea in this country,

both on the bodies of the hosts and in their nests. This flea is often found in considerable numbers on squirrels and is said to be even more numerous in some nests. One of the squirrels shot on the estate Villa Blanca, Goirle, harboured 30 females and 24 males of this flea. *Tarsopsylla o. octodecimdentata*, another host specific squirrel flea, has been found in the provinces of Overijssel and Gelderland. It is a nest flea and is never found in large numbers on the host. SMIT (1962a) commenting on this flea noted that it is more frequently found in association with squirrels occupying territories in mountainous areas.

Of the squirrels' nests the two collected at Beers were newly built. The grass covering the inner lining of hay was still partly green. Though the number of fleas found in these nests was small, they provide an indication that transport of fleas from the bodies of the hosts to their nests occurs rapidly. The nests collected at Beers were so-called "winter nests".

The fleas *C. g. gallinae* and *C. garei* may have straggled onto squirrels from deserted birds' nests which are often visited by squirrels and may occasionally be used to store their food. No bird fleas were found in the squirrels' nests examined. The bird flea-squirrel-association must be very short-lived.

CHIROPTERA

SMIT (1962a) enumerated 11 species of bat fleas recorded from 13 species of bats. No bat flea was hitherto recorded from Noord-Brabant; from Limburg on the contrary nine bat fleas have been recorded in the past and nearly all were recovered from bats occupying the caves of South Limburg. *Nycteridopsylla eusarca* Dampf, 1908, and *Ischnopsyllus elongatus* (Curtis, 1832) are species of bat fleas not yet reported to occur in Limburg. Both the latter species are host specific parasites of the bat *Nyctalus noctula* (Schreber) which does not hibernate in caves.

In Noord-Brabant we found one male *Ischnopsyllus elongatus* on a female *Epitesicus serotinus* (Schreber) taken at Vught from a crevice in a wall, December, 1964; a female *Ischnopsyllus octactenus* (Kolenati) on a female *Pipistrellus pipistrellus* (Schreber) taken at Vught from a hole in a tree, December, 1964; one female *Ischnopsyllus hexactenus* (Kolenati) from the nest of a stock dove *Columba oenas* Linnaeus, which was situated in a hole in a wall under the eave of a house and one female of the same species from a female *Plecotus auritus* (Linnaeus) taken from a cellar, both records from Mill, December, 1964. Seven *Plecotus auritus* 5 ♂, 2 ♀) were taken from a farmhouse at Tilburg. These bats were not infested with fleas, nor could any fleas be bred from the debris gathered from under the roost.

Although bats have no nests, they have specific fleas; this can be explained by the fact that bats return to a definite roosting place to rest, sleep or hibernate. This habit, which provides conditions not unlike those in a bird's nest, suits the adult fleas, while the faeces of the bats, accumulating on the floor under the roosts, ensure ideal food, shelter, temperature and humidity for the larvae of fleas and other ectoparasites.

DOMESTIC INFESTATIONS

Man and domestic animals can act as hosts for several species of fleas, which if conditions are suitable may become annoying pests.

Fleas usually responsible for domestic infestations are *Pulex irritans* Linnaeus, the so-called human flea; *Ctenocephalides canis* (Curtis), the dog flea, and *Ctenocephalides felis felis* (Bouché), the cat flea. These species and subspecies were taken by the author on a farm at Oisterwijk, November, 1964, where a dog harboured 1 ♀ of *P. irritans* and 1 ♂, 1 ♀ of *C. canis*, two cats carried 2 ♂ of *P. irritans* and 1 ♂, 2 ♀ of *C. felis felis* and 1 ♀ of *C. canis*, and five specimens (3 ♂, 2 ♀) of *P. irritans* were collected from two pigs in December, 1964.

Another species of domestic importance is, as we have seen already, *Nosopsyllus fasciatus*, the rat flea. Of less domestic importance are the species *Leptopsylla segnis* (Schönherr), *Archaeopsylla e. erinacei* (Bouché) and *Spilopsyllus cuniculi* (Dale) and the bird fleas *Ceratophyllus g. gallinae* (Schrank).

There are not many recent records of rat flea infestations in houses. SMIT (1962a) recorded a rat flea from a house. We obtained a rat flea from a mouse captured in our kitchen (see under *Mus musculus*). CLAASSENS & O'ROURKE (1965) reported a female *N. fasciatus* from a bed in a Cork suburb (Ireland).

L. segnis, the house mouse flea, feeds on man only when hungry; it could be contracted in rooms infested with house mice.

A. e. erinacei, the hedgehog flea has been recorded from cats and dogs and via these domestic animals it may be passed on to man. O'ROURKE (1960) commenting on animal pets as reservoirs of zoonotic infections, noted that the hedgehog accumulates and excretes all strains of *Leptospira* available in an area. It is however, not known, whether fleas are capable of transporting *Leptospira* from animals to man. We obtained three females and one male of the subspecies *A. e. erinacei* from a dog which had been playing with a hedgehog (Tilburg, October 15th, 1964). The fleas were put back on the dog, which was re-examined on October 17th. Only one female flea could be found then and though it is not easy to find four fleas on a dog, we assumed that the parasites had left the unusual host. The obstinate female persevering in its accidental host relationship was kept for our collection. One female was also found on a pole cat and one male and two females were taken from a weasel (see under records of fleas from Mustelidae).

Two male and one female specimens of *S. cuniculi* were taken from 15 domestic rabbits of which only one was infested (Wanroy, November, 1964). One male was also taken from a rabbit trapped at Mill, November, 1964.

S. cuniculi is a semi-sedentary flea. It attaches usually to the innerside of the ears of rabbits and of accidental hosts such as cats, dogs and hares. Heavily serrated lacinia ensure a firm attachment. *S. cuniculi* is the principal vector of the Myxoma virus in Western Europe. This virus is transmitted purely mechanically by the infected mouth parts of the rabbit flea. Occasionally rabbit fleas may feed on man. Hunters, and people dealing with dead rabbits are most liable to contract these fleas.

Ceratophyllus g. gallinae, a very common bird flea has often been reported to infest hen houses and may occasionally be found on mammals. During our obser-

vations in Noord-Brabant and Limburg we found it on *Apodemus sylvaticus*, *Mustela putorius* and *Sciurus vulgaris*.

The ability of this flea to maintain itself in dry aerial nests may have guided it to hen coops where the egg-laying and roosting habits of the hens must suit the fleas very much. It has been proven that *C. g. gallinae* will breed when fed only on rat's blood. We used white mice to feed hundreds of specimens of this flea. In hen houses *C. g. gallinae* may become a real pest and may have a deleterious effect on the health and egg production of the fowl. Where hens, dogs and cats live in close proximity one will often find fleas straggling from fowl to mammals and via these to man. Man can also contract *C. g. gallinae* by cleaning infested hen houses.

MEDICAL IMPORTANCE

Fleas are hosts to a variety of organisms, several of which can be harmful to the fleas only while others may also be passed on to the fleas' hosts. In some cases such organisms may be passed on to man directly or via other hosts. *N. fasciatus*, *P. irritans*, *C. canis*, *C. f. felis* and *L. segnis* are potential carriers of the Plague bacteria, *Pasteurella pestis*. Some fleas act as intermediate hosts of cestodes of medical importance. The more common cestodes are *Hymenolepis nana* Siebold, *Hymenolepis diminuta* Rudolphi and *Dipylidium caninum* Linnaeus. *Hymenolepis diminuta* is a parasite of rats and mice. Humans, especially children have been found infested too. The intermediate hosts of the tailed cysticercoids are the flour moth *Anisolabis annulipes* and the larval and adult forms of some beetles and the flea *N. fasciatus*. Human infestations are usually accomplished by consumption of fresh faeces of rats and mice (faecal contaminated food) and by consumption of insufficiently cooked bread stuff made from flour infested with grain insects.

H. nana is a parasite of rats and mice and even humans, especially children. Ingestion of ripe eggs of the cestode is possibly the commonest method by which humans, rats and mice become infested. There are a number of intermediate hosts in which the cysticercoid will develop and from them can be transferred to definite hosts. Important intermediate hosts are the fleas *C. canis*, *P. irritans* and some mealworms.

Dipylidium caninum is a cosmopolitan parasite of cats and dogs and may infest children occasionally. Intermediate hosts are *C. canis* and *P. irritans* as well as the dog louse *Trichodecta canis*. Dogs and cats infest themselves by eating infested fleas or lice. Children may be infested by accidentally eating infected fleas or lice, or cats and dogs may chew up the intermediate hosts and set free cysticercoids on to their coat or retain them in their mouth from where they can easily be passed on to man.

N. fasciatus is the most important vector of Endemic or Murine typhus. This disease is transmitted from rat to rat and other small mammals and from them to man by fleas. *C. canis* and *C. f. felis* have also been reported to be naturally infected with this disease and may therefore be potential carriers. *L. segnis* and possibly other fleas of small mammals are carriers of Murine typhus among their hosts and at times from these to man. The causative agent of Murine typhus is

Rickettsia mooseri which multiplies intracellularly in the fleas. Faeces of infected fleas are highly infectious. Human infestation is believed to occur when *Rickettsia* penetrate abraded skin at the sites of flea bites contaminated with flea faeces.

Two other diseases may possibly be transmitted to man by fleas: Tularemia and Salmonellosis. The etiological agent of Tularemia is *Pasteurella tularensis*. It has many vertebrate reservoirs and arthropod vectors, the most efficient ones being ticks which are often responsible for this disease in man. There is little in the epidemiology of Tularemia in man to suggest that fleas are important vectors. But fleas appear to play a definite part in transmission of Tularemia to animals, and man usually contracts Tularemia by handling infected mammals. Trappers and hunters are particularly liable to become infested. Tularemia is a plague-like disease, mainly affecting rodents in North-America, Japan, U.S.R.R., and several European countries. In man it has a mortality rate of four percent.

Salmonellosis has been transmitted experimentally to mice by the fleas *Xenopsylla cheopis* (Rothschild) and *N. fasciatus*. These fleas were infected with *Salmonella enteritidis* and *S. typhimurium*, but only the former bacterium was transmitted and the exact mode of transmission was not determined. Regurgitation into the bite-wound of the host seemed probable.

For collateral reading on economic (domestic veterinary and medical) importance of fleas we refer to JELLISON (1959), LAPAGE (1956 and 1957) and RIVERS & HORSFALL (1959).

SEX RATIOS IN MAMMAL FLEAS

Significant numbers of specimens of fleas for a reliable determination of their sex ratios were obtained for *Ctenophthalmus agyrtes smitianus* (88 specimens, 50% males), *Leptopsylla segnis* (79 specimens, 45% males), *Monopsyllus s. sciurorum* (602 specimens on the bodies of the hosts, 48% males and 63 specimens from three nests, 43% males) and for *Nosopsyllus fasciatus* (31 specimens, 30% males).

The predominance of females among mammal fleas is usually pronounced. The highest ratio was found for *N. fasciatus*. CLAASSENS & O'ROURKE (1965) found 30% males among specimens of *N. fasciatus* collected in Ireland. SMIT (1962b) reported that of 13,330 fleas collected from 1005 moles and 45 moles' nests the sex ratio for the former was 47% males and for the latter 38% males. Female fleas according to SMIT may spend more time in the nests than males. MEAD-BRIGGS & PAGE (1964) surmised that the predominance of female fleas on the bodies of hosts may be due to the greater need of nutriment for egg production. Since female fleas are more numerous both on the hosts and in their nests it is clear that at any stage in the adult state of fleas females outnumber the males. One exception may be *Doratopsylla d. dasycnema*, a host specific shrew flea for which the sex ratio for specimens on the bodies of the hosts is about 2 : 1 in favour of the males. See also sex ratios in bird fleas in this paper.

B. BIRD'S NESTS

Nearly 200 birds are known to breed in The Netherlands (SMIT, 1962a), but only 44 of these have so far been recorded as hosts of Siphonaptera. During our survey we found fleas of 13 unrecorded avian hosts' nests and for 13 other species of birds new host-flea-associations were found.

In the following synopsis of the material collected during the months of October, November and December, 1964, the newly recorded hosts and the newly recorded flea-host-associations have been marked with an asterisc. It can be used as a supplement to SMIT (1962a).

The localities from which nests of each species of birds (nests of 45 species of birds were examined) were collected are listed. After each locality the number of nests investigated and the number (in brackets) of nests found infested are given together with the number, sex and species of flea collected after incubation of the nests. The first figure under each species of flea indicates the number of male and the second figure indicates the number of female specimens obtained. All birds are listed under their respective families. For the nomenclature of the birds we have followed DOBBEN (1963). Subspecific names were only used for subspecies easily recognisable in the field.

TURDIDAE

Turdus merula Linnaeus, the blackbird.

Beers: 2(1), *Ceratophyllus g. gallinae* : 2, 3.

Goirle: 2(1), *C. garei* : 45, 60.

Mill: 5(2), nest 1: *C. garei* : 49, 56; nest 2: *C. g. gallinae* : 5, 3.

**Megabothris turbidus* : 0, 1.

St. Hubert: 6(1), *C. g. gallinae* : 2, 3.

Tilburg: 7(3), nest 1: *C. garei* : 80, 65; **C. fringillae* : 0, 1; nest 2: *C. garei* : 83, 127; *C. fringillae* : 11, 8; nest 3: *C. g. gallinae* : 4, 7.

Wanroy: 2(1), *C. garei* : 52, 68; *C. g. gallinae* : 2, 3; **Dasyphylus gallinulæ gallinulæ* : 2, 9.

Turdus ericetorum Turton, the song thrush.

Goirle: 2(0).

Mill: 3(1), *C. g. gallinae* : 2, 3.

St. Hubert: 1(1), **C. garei* : 2, 5.

Tilburg: 3(1), *C. g. gallinae* : 3, 7; **C. fringillae* : 1, 4.

**Turdus viscivorus* Linnaeus, the mistle thrush.

Mill: 1(1); *C. g. gallinae* : 1, 3.

Tilburg: 2(1), *C. garei* : 13, 17.

Wanroy: 2(1), *C. gallinae* : 15, 14; *C. fringillae* : 2, 5.

Phoenicurus phoenicurus (Linnaeus), the redstart.

Mill: 2(2), nest 1: *C. g. gallinae* : 9, 18; nest 2: *C. g. gallinae* : 4, 7; **C. fringillae* : 3, 6.

Erythacus rubecula (Linnaeus), the robin.

Mill: 1(1), **D. g. gallinulae* : 0, 1.

Goirle: 1(1), *C. garei* : 4, 5.

FRINGILLIDAE

Chloris chloris (Linnaeus), the greenfinch.

Mill: 1(1), **C. g. gallinæ* : 15, 21; **C. garei* : 7, 8.

Fringilla coelebs Linnaeus, the chaffinch.

St. Hubert: 3(1), *C. g. gallinæ* : 2, 5; **C. fringillæ* : 0, 2.

Venray : 1(1), *C. g. gallinæ* : 1, 1.

**Emberiza citrinella* Linnaeus, the yellow hammer.

Mill: 1(1), *C. garei* : 12, 14.

Beers: 2(1), *C. garei* : 1, 3; *C. g. gallinæ* : 3, 7.

TROGLODYTIDAE

Troglodytes troglodytes (Linnaeus), the wren.

Tilburg: 3 (2), nest 1: *C. garei* : 5, 7; *D. g. gallinulae* : 1, 3; nest 2: *C. garei* : 15, 19.

Wanroy: 1(1), *C. g. gallinæ* : 0, 3; **M. turbidus* : 0, 1; *Ctenophthalmus agyrtes smitianus* : 0, 1.

PRUNELLIDAE

Prunella modularis (Linnaeus), the hedge sparrow.

Mill: 1(0).

St. Hubert: 3(0).

Wanroy: 1(1), *C. g. gallinæ* : 4, 5.

Tilburg: 2(1), *C. g. gallinæ* : 5, 4; **C. garei* : 2, 3.

MOTACILLIDAE

Motacilla alba Linnaeus, the pied wagtail.

Goirle: 1(0).

Beers: 1(1), **C. garei* : 13, 20.

**Motacilla flava flava* Linnaeus, the yellow wagtail.

Tilburg: 1(1), *D. g. gallinulae* : 0, 1.

PARIDAE

Parus major Linnaeus, the great titmouse.

Mill: 1(1), *C. g. gallinæ* 4, 7; *C. garei* : 0, 1.

Parus caeruleus Linnaeus, the blue titmouse.

Mill: 1(1), *C. g. gallinæ* : 13, 12.

Venray: 1(1), *C. g. gallinæ* : 1, 1.

**Aegithalos caudatus* (Linnaeus) the long-tailed titmouse.

Oisterwijk: 1(1), *C. g. gallinæ* : 7, 13.

STURNIDAE

Sturnus vulgaris Linnaeus, the starling.
Goirle: 3 (0).

Mill: 4(1), *C. g. gallinae* : 2, 1.

Oisterwijk: 3 (2), nest 1: *C. g. gallinae* : 4, 6; nest 2: *C. fringillae* : 1, 3.

PASSERIDAE

Passer domesticus (Linnaeus), the house sparrow.
Oisterwijk: 3(2), nest 1: *C. gallinae* : 15, 17; nest 2: *C. gallinae* : 2, 7. *C. fringillae* : 2, 5.

St. Hubert: 2(1), *C. g. gallinae* : 7, 5.

PICIDAE

**Picus viridis* Linnaeus, the green woodpecker.
Tilburg: 1(1), *C. g. gallinae* : 3, 3; *Monopsyllus sciurorum* : 1, 2.
Oisterwijk: 1(1), *C. g. gallinae* : 0, 2; *C. garei* : 4, 7.

LARIDAE

**Chlidonias niger* (Linnaeus), the black tern.
Strabrechtsche heide, Witven: 10(1), *C. garei* : 3, 9.

RALLIDAE

Gallinula chloropus (Linnaeus), the moorhen.
Oisterwijk: 2(1), **D. g. gallinulae* 7, 12.
**Fulica atra* Linnaeus, the coot.
Strabrechtsche heide, Witven: 1(1), *C. g. gallinae* : 0, 2.

SYLVIIDAE

Acrocephalus scirpaceus (Hermann) the reed warbler.
Oisterwijk: 2(1), **D. g. gallinulae* : 1, 3; *C. garei* : 4, 5.

COLUMBIDAE

Columba livia domestica Linnaeus, the domestic pigeon.
Mill: 3(1), *C. gallinae* : 2, 2.
St. Hubert: 5(2), *Ceratophyllum columbae* : 1, 1; *C. g. gallinae* : 2, 2.
Tilburg: 7(1), *C. g. gallinae* : 5, 4.
Columba oenas Linnaeus, the stock dove.
Mill: 2(1), **C. g. gallinae* : 0, 2; **Ischnopsyllus hexactenus* : 0, 1.
Tilburg: 1(1), *C. g. gallinae* : 5, 9.

**Columba palumbus* Linnaeus, the wood pigeon.

Mill: 10(2), *C. columbae* : 1, 0; nest 2: *C. g. gallinae* : 0, 2.

Oisterwijk: 7(0).

Tilburg: 8(1), *C. g. gallinae* : 2, 2; *M. sciurorum sciurorum* : 1, 0.

**Streptopelia turtur* (Linnaeus), the turtle dove.

St. Hubert: 3(0).

Wanroy: 5(1), *C. g. gallinae* : 3, 1.

**Streptopelia decaocto* Friv., the collared dove.

Mill: 2(1), *C. g. gallinae* : 5, 8.

St. Hubert: 2(0).

CORVIDAE

Corvus frugilegus Linnaeus, the rook.

Wanroy: 1(1), *C. g. gallinae* : 4, 7.

**Pica pica* (Linnaeus), the magpie.

Schayk: 1(1), *C. g. gallinae* : 0, 1.

Corvus monedula Linnaeus, the jackdaw.

Tilburg: 3(1), *C. g. gallinae* : 17, 29.

**Garrulus glandarius* (Linnaeus), the jay.

Mill: 5(2), nest 1: *C. g. gallinae* : 0, 3; nest 2: *C. g. gallinae* : 1, 4; *M. s. sciurorum* : 1, 1.

STRIGIDAE

**Tyto alba* (Scopoli), the barn owl.

Goirle: 4(1); *C. g. gallinae* : 0, 1; *C. a. smitianus* : 1, 1.

FALCONIDAE

Accipiter nisus (Linnaeus) the sparrow hawk.

Beers: 1(1), *C. g. gallinae* : 0, 1; **C. garei* : 7, 5; **C. fringillae* : 1, 3.

**Falco tinnunculus* Linnaeus, the kestrel.

Goirle: 1(1), *C. g. gallinae* : 0, 3 (identification of nest doubtful, but kestrels were seen on the nesting site. Though this record is new to The Netherlands it wants reconfirmation).

HIRUNDINIDAE

Delichon urbica (Linnaeus), the house martin.

Goirle: 1(1), *Ceratophyllum birundinis* : 51, 67; *C. rusticus* : 13, 9; *C. f. farreni* : 2, 5.

Schinnen: 2(2) nest 1: *C. birundinis* : 209, 275; *C. rusticus* : 67, 110; nest 2: *C. birundinis* : 97, 117; *C. rusticus* : 13, 19; *C. f. farreni* : 22, 29.

Hirundo rustica Linnaeus, the swallow.

Goirle: 1(0).

Mill: 5(1), *C. hirundinis* : 7, 5.

Tilburg: 3(0).

St. Michiels Gestel: 3(1); **Nosopsyllus fasciatus* : 0, 1.

Wanroy: 7(1): *C. g. gallinæ* : 1, 5.

Riparia riparia (Linnaeus), the sand martin.

Mill: 3(3), *Ceratophyllus s. styx* : nest 1: 21, 29; nest 2: 54, 70; nest 3: 45, 59.

Venlo: 2(2), *C. s. styx* : nest 1: 13, 31; nest 2: 34, 47; *C. g. gallinæ* : nest 2: 7, 13.

DISCUSSION OF NESTS INVESTIGATION

A total of nine species of bird fleas and five species of mammal fleas were collected from 204 nests of 45 species of birds. Not less than 77 nests (38%) were found to be infested. The number of fleas collected from individual nests was very variable. This of course was partly due to the ecological conditions prevailing in the nests after they were deserted by the birds. There may also be an inter-specific difference in the reproductive capacity of fleas. *C. garei* and *C. g. gallinæ*, as well as all martin fleas appear to be prolific breeders, while *D. g. gallinulæ* and *C. fringillæ* may have a less abundant offspring. Furthermore the main breeding season of bird fleas coincides with that of the bird hosts and hence the longer a nest is occupied either by adult or young birds the more favourable conditions are for the reproduction of fleas. Although most of the nests collected by us will have been occupied for at least some time by the hosts we have no idea about the duration of this occupation. The dry hot summer and our collecting of nests at random may be responsible for the moderate percentage of nests infested. ASH (1952) examined 109 nests of 23 species of birds in England and found that of 27 nests which had not contained young birds before they were deserted by the adults, 41% were infested; of eight nests which had contained young, but which were deserted by the adults before the young could leave, 50% were infested; of 66 nests from which young had fledged 56% were infested, and of eight nests which had contained eggs at one time but in which it was doubtful whether there had been young or not, 40% were infested. These figures show that the duration of occupation of nests by birds influences the degree of infestation.

The main difference in the percentage of infested nests examined by ASH and ourselves is due to the fact that we included 46 nests of tree-nesting birds which on the whole provide poor ecological requirements for ectoparasites to maintain themselves in these nests. Only ten of those 46 nests were found infested. Moreover, ASH collected birds' nests earlier in the year at a time that fewer fleas (larvae and pupae included) were lost through predation by enemies of fleas and through the activities of internal and external parasites. Taking all circumstances into account the percentage of infestation obtained by us may be considered rather high and it is an indication that by the majority of fleas hibernating is accomplished by survival as adult but especially as pupae in the hosts' nests. It would be of interest to examine a collection of birds' nests collected in February and March and compare the results.

HOST SPECIFICITY IN BIRD FLEAS

The species *C. birundinidis*, *C. rusticus*, *C. f. farreni* and *C. s. styx* are monoxenous parasites of the family Hirundinidae. *C. columbae* is a pigeon flea. The degree of humidity in the nests seems to determine whether any of the remaining four species of fleas will thrive or not. Since the situation of the nests is the chief factor determining the humidity one can conveniently divide birds' nests into the following four categories:

- 1, nests on or near the ground or otherwise in a wet position;
- 2, nests of bush nesting birds and nests built in positions providing the same degree of humidity. Nests in coniferous trees especially those in low position would belong to this group;
- 3, nests of hole nesting birds. The holes may be natural as well as artificial. Nests of sand martins, woodpeckers, tree creepers, as well as nests built in crevices of rocks and walls and those built in nest-boxes constitute this group;
- 4, nests of tree nesting birds. These nests are usually very dry, at least during the hot summer season. Many of these nests will be found uninfested particularly when little nest material is used. If such nests are infested the number of fleas present is often very small.

Sometimes nests built in holes may be very humid and this usually is reflected by large numbers of fleas occurring in them. Sand martin burrows for instance may be found teeming with fleas. CLAASSENS (1965a) collected 1,742 specimens of the subspecies *C. styx jordani* Smit, 1956, from five sand martin burrows taken at Little Island, Co Cork, Ireland in July, August and October, 1963. From three starlings' nests situated in deserted sand martins' burrows 4,025 specimens of *C. g. gallinæ* were collected at Ballycroneen strand, Ireland, in June and July, 1964 (CLAASSENS & O'ROURKE, 1965). None of these nests were incubated. These results prove that *C. g. gallinæ* thrives very well in nests where the humidity is very high. On the other hand *C. g. gallinæ* may be found in dry airy nests of pigeons. ROTHSCHILD & CLAY (1952) commented that *C. g. gallinæ* is the flea par excellence of dry aerial nests. ROTHSCHILD (1952) noted: "Despite the wide range of hosts, *C. g. gallinæ* is much more common in nests of birds which are built in holes and at some distance from the ground". These statements seemingly contradictory in meaning indicate the wide range of tolerance of this flea to humidity. With ASH (1952) we would suggest that the nests of hole-nesting birds form a more congenial habitat for this flea than nests in a more exposed situation. But it is equally true that *C. g. gallinæ* is often found in dry aerial situations. *C. g. gallinæ* shares humid nests with *C. garei* and *D. g. gallinulae*, two species commonly infesting the nests of ground and bush nesting birds, provided these nests are not dry. On the other limit of tolerance to humidity *C. g. gallinæ* is often found in company with *C. fringillæ* and *C. columbae*, two species of flea which seem to prefer the dryer types of nests. To the former group we may add the rare Dutch flea *Ceratophyllus borealis* Rothschild, 1907, which in its distribution seems to be restricted by climatic and geological conditions. The group *gallinæ*, *fringillæ* and *columbae* may be extended with the

equally rare flea *Ceratophyllus r. rossitensis* Dampf, 1913, which is a monoxenous parasite of the crow, *Corvus corone* Linnaeus.

In table II, avian hosts are classified according to the four categories of nesting sites mentioned above. After each species of bird the number of nests examined from each nesting site and the number (in brackets) of nests infested are given. The host specific fleas of the Hirundinidae and the species *C. columbae* in nests of pigeons are omitted. Some nests of black birds are classified under different categories because these nests were found in a variety of situations. Under each species of flea recorded, the number of specimens found in the total number (in brackets) of nests infested with that flea are given.

One should be aware of the fact that any classification of this kind is very artificial because nests can be dry or wet in any of the four situations depending upon accidental local ecological circumstances.

Table II. Distribution of nests and their flea population with regard to the nest situation

Details of nests examined		Details of flea population				
Host species	No. of nests examined and infested	<i>Ceratophyllus garei</i>	<i>Dasyphillus galinulae galinulae</i>	<i>Ceratophyllus galiniae galiniae</i>	<i>Ceratophyllus fringillae</i>	Total of fleas
Ground						
<i>Turdus merula</i> L. (in ivy) . . .	3 (3)	460 (3)	—	—	20 (2)	480
<i>Emebriza citrinella</i> L.	3 (2)	30 (2)	—	10 (1)	—	40
<i>Troglodytes troglodytes</i> (L.) . . .	4 (3)	46 (2)	4 (1)	3 (1)	—	53
<i>Motacilla flava</i> flava L.	1 (1)	—	1 (1)	—	—	1
<i>Chlidonias niger</i> (L.)	10 (1)	12 (1)	—	—	—	12
<i>Gallinula chloropus</i> (L.)	2 (1)	—	19 (1)	—	—	19
<i>Fulica atra</i> L.	1 (1)	—	—	2 (1)	—	2
Bush						
<i>Turdus merula</i> L.	21 (6)	225 (2)	11 (1)	34 (5)	—	270
<i>Turdus ericetorum</i> Turton	9 (3)	7 (1)	—	15 (2)	5 (1)	27
<i>Turdus viscivorus</i> L.	5 (3)	20 (1)	—	33 (2)	7 (1)	60
<i>Erythacus rubecula</i> (L.)	2 (2)	9 (1)	1 (1)	—	—	10
<i>Chloris chloris</i> (L.)	1 (1)	15 (1)	—	36 (1)	—	51
<i>Fringilla coelebs</i> L.	4 (2)	—	—	9 (2)	2 (1)	11
<i>Prunella modularis</i> (L.)	7 (2)	5 (1)	—	18 (2)	—	23
<i>Aegithalos caudatus</i> (L.)	1 (1)	—	—	20 (1)	—	20
<i>Acrocephalus scirpaceus</i> (Herman)	2 (1)	9 (1)	4 (1)	—	—	13
<i>Phylloscopus collybita</i> (Vieillot)	1 (0)	—	—	—	—	—
Holes						
<i>Phoenicurus phoenicurus</i> (L.) . . .	2 (2)	—	—	38 (2)	9 (1)	47
<i>Muscipata striata</i> (Pallas) . . .	1 (0)	—	—	—	—	—

Table II (continued)

Details of nests examined		Details of flea population					Total of fleas
Host species	No. of nests examined and infested	<i>Ceratophyllus garei</i>	<i>Dasyphylus gallinulae</i>	<i>Ceratophyllus gallinulae</i>	<i>Ceratophyllus gallinaceae</i>	<i>Ceratophyllus fringillae</i>	
<i>Motacilla alba</i> L.	2 (1)	33 (1)	—	—	—	—	33
<i>Parus major</i> L.	1 (1)	1 (1)	—	11 (1)	—	—	12
<i>Parus caeruleus</i> L.	2 (2)	—	—	27 (2)	—	—	27
<i>Parus palustris</i> L.	1 (0)	—	—	—	—	—	—
<i>Sturnus vulgaris</i> L.	10 (3)	—	—	13 (2)	4 (1)	—	17
<i>Passer domesticus</i> (L.)	5 (3)	—	—	53 (3)	7 (1)	—	60
<i>Passer montanus</i> (L.)	2 (0)	—	—	—	—	—	—
<i>Picus viridis</i> L.	2 (2)	11 (1)	—	8 (2)	—	—	19
<i>Columba livia domestica</i> L.	15 (4)	—	—	17 (3)	—	—	17
<i>Columba oenas</i> L.	3 (2)	—	—	16 (2)	—	—	16
<i>Tyto alba</i> (Scopoli)	4 (1)	—	—	1 (1)	—	—	1
<i>Falco tinnunculus</i> L.	1 (1)	—	—	3 (1)	—	—	3
<i>Riparia riparia</i> (L.)	5 (5)	—	—	20 (1)	—	—	20
<i>Hirundo rustica</i> L.	19 (3)	—	—	6 (1)	—	—	6
<i>Corvus monedula</i> L.	3 (1)	—	—	46 (1)	—	—	46
Trees							
<i>Columba palumbus</i> L.	25 (3)	—	—	6 (2)	—	—	6
<i>Streptopelia turtur</i> (L.)	8 (1)	—	—	4 (1)	—	—	4
<i>Streptopelia decaocto</i> Friv.	4 (1)	—	—	13 (1)	—	—	13
<i>Corvus frugilegus</i> L.	1 (1)	—	—	11 (1)	—	—	11
<i>Pica pica</i> (L.)	1 (1)	—	—	1 (1)	—	—	1
<i>Garrulus glandarius</i> (L.)	5 (2)	—	—	8 (2)	—	—	8
<i>Accipiter nisus</i> L.	1 (1)	12 (1)	1 (1)	1 (1)	4 (1)	—	17
<i>Asio otus</i> (L.)	1 (0)	—	—	—	—	—	—
Total nos.	177 (65)	895 (19)	41 (7)	482 (48)	58 (9)	1466	
Average fleas per nest infested	—	47	6	10	7	—	—

is rarely found in large numbers, but *C. g. gallinæ* may be present by hundreds in one single nest as we have shown earlier. Many specimens may sometimes also be bred from the nests. The author bred 1,064 specimens from one nest of a blue tit, *Parus caeruleus*, situated in a hole in a wall at Blarney, Co Cork, Ireland (CLAASSENS & O'ROURKE, 1965). On the days of collection, June 2nd, 1964, the nest contained only one female *D. g. gallinulae*. During incubation, which lasted from June 2nd until July 6th only five additional males and six females of *D. g. gallinulae* were obtained. ASH (1952) obtained 1,304 *C. g. gallinæ* from a blue tit's nest.

From table II it may be seen that the average number of fleas per infested nest is rather low for the subspecies *D. g. gallinulae* and *C. g. gallinæ*. *D. g. gallinulae*

D. g. gallinulae seems to be fairly scarce in The Netherlands, where it has so far been found in five provinces. SMIT (1962a) commented that this species should be commonly present here as it is found in abundance in surrounding countries. We investigated 53 nests situated in bushes and hedges but we found that only three of these harboured *D. g. gallinulae*. Of 24 nests collected on or near the ground only three contained this species. *D. g. gallinulae* may experience a good deal of competition from *C. garei* which appeared to be very common in the nests of both ground- and bush nesting birds. *C. garei* shares humid nests with *C. g. gallinæ* too and may thus also be responsible for the relative scarcity of the latter species.

C. fringillæ prefers dryer nests of the house sparrow, *Passer domesticus*, and starlings, *Sturnus vulgaris*, as well as the dry nests of other Passerine birds. Strangely enough we found 19 specimens in a very humid nest of a blackbird which was situated in ivy against a stone wall. It may be that this population of *C. fringillæ* originated in the nest of a spotted fly catcher, *Muscicapa striata*, which reared young in the same ivy the year before. Its presence in the nest of a sparrow hawk, *Accipiter nisus*, may have been the result of predation.

ROTHSCHILD (1958) found a seasonal variation with regard to the species of fleas infesting birds (migrants and residents) on Fair Isle. In spring 66% of all fleas found on migrant and resident birds were *D. g. gallinulae* and 16% were *C. g. gallinæ* but in autumn the situation was reversed and *C. g. gallinæ* became by far the most common species both on residents as on migrant species. ROTHSCHILD suggested that the main dispersal period of *D. g. gallinulae* (and *C. borealis*) is the spring and of *C. g. gallinæ* the summer and autumn. Indeed in summer *C. g. gallinæ* may be found teeming in birds' nests. CLAASSENS & O'ROURKE (1965), as was mentioned already, collected 4,025 specimens of this flea from three starlings' nests in June and July (1964) and 1.064 specimens were bred from a blue tit's nest during June, 1964.

Very few adult fleas were found by the author in the nests collected in Noord-Brabant and Limburg. It seems likely that adult fleas leave the hosts' nests after the young birds have left in late summer or earlier. These manoeuvres undoubtedly increase the survival chances and dispersal of fleas. ROTHSCHILD (1958) found that spring migrants (199 specimens) had an infestation rate of 52,2% as compared with 2,7% of 615 autumn migrants. It may be that in autumn fleas are more active in searching for a sheltered place to hibernate while in spring they may become very eager to find a host.

SEX RATIOS IN BIRD FLEAS

In Table III the numbers of either sex of bird fleas collected and the percentages of males among them are listed. Some of the results are compared with those obtained by CLAASSENS & O'ROURKE (1965) for the same species collected in Ireland and with those obtained by ASH (1952) for specimens taken in England. The percentages of males among martin fleas are compared with results published by CLAASSENS (1965b), who studied these fleas in Ireland, and with those recorded by THOMPSON (1952; 1953) from England and with the ones

TABLE III. Percentages of males among the total number of fleas from Noord-Brabant and Limburg, compared with those obtained for the same species elsewhere

Species of fleas	Number of males and females and percentages of male specimens in the present collection of fleas	The total number of specimens and percentages of males collected elsewhere		average percentage male specimens per- centages male
		♂	♀	
<i>C. garei</i>	394	501	44%	44.5%
<i>D. gallinulae</i>	11	29	28	33%
<i>C. gallinae</i>	190	292	39%	43%
<i>C. fringillae</i>	21	37	38%	38%
<i>C. hirundinis</i>	364	464	44%	41%
<i>C. rusticus</i>	93	138	40%	44%
<i>C. farreni</i>	24	34	41%	40%
<i>C. styx jordani</i>	167	236	41%	44%

recorded by DUNNET & ALLAN (1954) of martin fleas collected in Scotland. The figures pertaining the subspecies *C. s. styx* are compared with those of *C. s. jordani* Smit, 1955, collected in Ireland and with the percentages known for the species *C. styx* collected in England.

The species *C. columbae* is omitted as too few specimens were found. No comparative results were available for *C. fringillae*.

In bird fleas there is a definite predominance of females. Although with some species there is a wide range of variation in the percentages of the sexes recorded by diverse authors it seems likely that the average percentages shown in Table III will be close to the prevailing situation in the nests of the hosts. ROTHSCHILD (1958) found a gradual increase of females on the birds of Fair Isle from spring until autumn. There was, however, a preponderance of male *D. g. gallinulae* on spring passage migrants. In July there was an excess of females on resident birds and on September and autumn migrants only females were found. In the nests of the Fair Isle birds ROTHSCHILD found a six percent majority of female *D. g. gallinulae*. Both the predominance of males of *D. g. gallinulae* on spring passage migrants and the low sex ratio of these fleas in the nests of the hosts are very unexpected and should make a rewarding object of further investigation. Females of *C. g. galliniae* outnumbered males both in the nests and on the bodies of the birds of Fair Isle, but on the hosts there was a gradual increase of females.

ROTHSCHILD (1958) drew the attention to the low ratio 48—50 in favour of female *C. g. galliniae* found in the nests of the common resident bird, the wheatear, *Oenanthe oenanthe* (L.). CLAASSENS & O'ROURKE (1965) reported an exceptional ratio 200 : 114 in favour of males in *C. g. galliniae* taken from a starlings' nest collected at Ballycroneen strand, Ireland, in June, 1964. We do not know what ecological or genetic factors favour an unusual high production of males or result in the survival of more males than females.

The apparent predominance of females among adult fleas is no indication that fewer male flea embryos should be produced (primary sex ratio), nor that fewer male fleas hatch from cocoons (secondary sex ratio). Numerical preponderance of females may well develop in later stages of adult fleas. A collection of fleas from birds' nests taken in February and March might well reveal a still higher sex ratio in favour of females. Females seem to outlive males by many months and can withstand adverse conditions to which males succumb. Males of many species of fleas are believed to die soon after copulation. A gradual increase of female fleas seems therefore natural especially on the bodies of the host since, after copulation, females lay eggs in batches, and each time before a fertile batch is laid the female reproductive organs require the stimulus of a blood meal (ROTHSCHILD & CLAY, 1952).

The greater hardiness of females may sometimes be responsible for their great predominance in collections made under artificial laboratory conditions. A predominance of females was also found among stragglers of mammal flea species to birds' nests. Of five species of mammal fleas collected from birds' nests discussed here we found that of a total of 13 specimens nine were females. MEAD-BRIGGS & PAGE (1964) found that of 56 fleas other than *S. cuniculi* which were found as

stragglers on 30 out of 279 rabbits obtained throughout Great Britain, 38 were females and they noted that similar results were recorded previously from Kent.

SUMMARY

Nineteen species of mammals (336 specimens) and 204 nests of 45 species of birds were examined for fleas. In total 954 specimens (23 species) of mammal fleas and 12 specimens (2 species) of bird fleas were collected from the bodies of 174 mammals infested, while 63 specimens of the subspecies *Monopsyllus s. sciurorum* (Schrank), were taken from three nests of the red squirrel, *Sciurus vulgaris* Linnaeus.

From 77 birds' nests found infested 2,997 specimens (nine species) of bird fleas were reared and 13 specimens (five species) of mammal fleas were obtained.

All this material was collected in the provinces of Noord-Brabant and Limburg, The Netherlands, mainly during the months of October, November and December, 1964.

Fifteen mammal fleas and five bird fleas were found to be new to Noord-Brabant and two mammal fleas and four bird fleas could be added to the list of Siphonaptera of Limburg. Thirteen species of birds and two species of mammals, viz. *Sorex minutus* Linnaeus and *Mustela lutreola* (Linnaeus) were added to SMIT's (1962a) lists of hosts for Dutch fleas. For 23 flea hosts recorded in SMIT (1962a) new flea-host-associations were found.

The ecology, host- and nest specificity, sex ratios and economic importance (domestic infestations, veterinary and medical importance) of fleas were discussed.

In a synopsis of Dutch fleas every species is followed by the names of the provinces from which it was recorded by SMIT (1962a) and our records for Noord-Brabant and Limburg were added and marked with an asterisc.

Mammal fleas were dealt with under the relevant mammalian hosts examined. Bird fleas were first listed in a synopsis of material collected so as to make exact recording possible. In a further discussion of these fleas special attention was paid to their host or nest site specificity.

Sex ratios in bird fleas were compared with results recently obtained by the author and by other students of fleas.

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THE GROUP OF *PSENUCUS PULCHERRIMUS* (BINGHAM) (HYMENOPTERA, SPHECIDAE)

BY

J. P. VAN LITH

Rotterdam, The Netherlands

Abstract

The distribution in the Indo-Australian and East-Asiatic regions of the group is discussed. The material studied originates from localities in a triangular area formed by Gujarat in the West, Japan in the North and northeastern Australia in the South. The subgenus *Eopsenulus* Gussakovskij, 1934, was erected for *Psenulus iwatai* Gussakovskij, 1934 (Japan). This form is regarded here as the Japanese representative of the group of *Psenulus pulcherrimus* (Bingham, 1896). The provisional classification as a group is preferred as long as other subgenera of *Psenulus* are not yet defined. The relationship between the forms from western India and those from northeastern Australia is very close; *P. carinifrons* Cameron, 1902 (Deesa) and *P. scutellatus* Turner, 1912 (Queensland), are considered to be subspecies only. Even *P. iwatai* may prove merely to be a subspecies of the Indian form. *P. sinclairi* Lal, 1939 (Bombay), which could not be examined, and a probably new subspecies from South India, are also very closely related to *P. carinifrons*. A key to the species and subspecies is provided. The distribution of the eleven forms is given, together with new records of the species already treated in a previous paper. One new subspecies from New Guinea is described.

In a study on *Psenulus* (Van Lith, 1962) I have provisionally divided the Indo-Australian species (about 70 species and subspecies from this region have been described) into a number of groups, in order to facilitate the future definition of subgenera. GUSSAKOVSKIJ (1934) described the subgenus *Eopsenulus* for *Psenulus iwatai* Gussakovskij (Japan). This species differs very much from the other East-Asiatic congeners in having a narrow and protruding carina between the antennae. It is evident now that the group of *P. pulcherrimus* is identical with the subgenus *Eopsenulus* Gussakovskij. The characters of the latter group are: a slender body, a narrow and protruding carina between the antennae, a largely or completely black scutum, an almost interstitial first recurrent vein of the fore wings, and the female with triangularly or bluntly protruding anterior margin of clypeus and narrow pygidial area. There is a great contrast between the females and the males in the sculpture of the back of the propodeum, viz., almost smooth in the female and coarsely reticulate in the male.

It seems premature to delimit more subgenera of *Psenulus*; therefore I prefer to use in this paper the provisional term "group of *P. pulcherrimus*".

During the last few years I received material from a larger area than that studied in 1962 and this brings the total number of species and subspecies of the group to ten, probably eleven. The components are distributed over a large triangular area, reaching from Gujarat in India, northward to Japan and from there south-

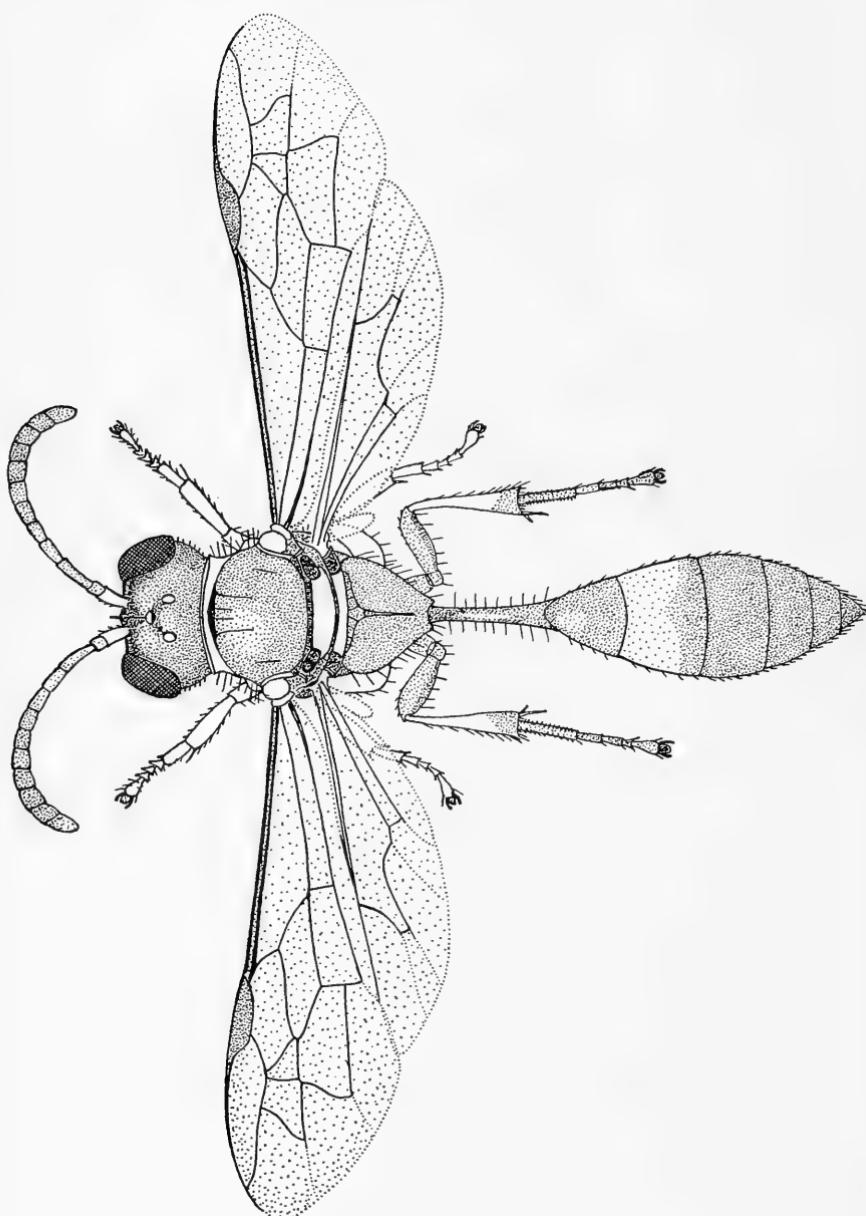


Fig. 1. *Prenulus carinifrons xanthognathus* Rohwer, ♀, from Negros (Philippine Islands)

ward over New Guinea to northeastern Australia (Fig. 2). It is interesting that the forms from the outer angles of this area are not only closely related but even conspecific (*P. carinifrons carinifrons* (Cameron), from Gujarat and *P. carinifrons scutellatus* Turner, from northeastern Australia) or probably conspecific (*P. iwatai* from Japan). There is one "island" in this area, formed by the range of distribution of *P. sogatophagus* Pagden, the female of which is different, having one tooth more on the mandibles; this species has been found in Malaya, Thailand and Assam. Another species, *P. pulcherrimus* (Bingham), showing distinct specific differences, with more pointed clypeus and red gaster, inhabits Tenasserim, and has a subspecies, *P. pulcherrimus projectus* Van Lith, in Java. The two subspecies, *P. carinifrons xanthognathus* Rohwer and *P. carinifrons rohweri* Van Lith, seem to be closely allied and are characterized in the male sex by the coarser carination of the back of the propodeum. They occupy the large area formed by Malaya and the Indonesian islands (*P. carinifrons rohweri*), and the Philippines (*P. carinifrons xanthognathus*).

Some of the forms of the group of *P. pulcherrimus* are somewhat variable as to the extent of the yellow marking, especially on the pronotum and the scutellum, and also on the fore and mid femora. Examples of the variation of the markings of the thorax in females of *P. sogatophagus* are presented in Fig. 3 and 4 and of the variation in two males of *P. carinifrons scutellatus* in Fig. 6 and 7. The fact that the Bornean specimens of *P. carinifrons rohweri* all have darker legs than those from the more southern islands, may be of a greater systematic value and I am not excluding the possibility that they represent a different subspecies. The males of *P. carinifrons xanthognathus* which I studied from the neighbouring island of Mindanao, have also darker fore and mid femora than the specimens from the northern Philippine Islands. Apart from the colour of the gaster there is a great resemblance between the females of *rohweri* and *xanthognathus*. However, more material, especially from the southern Philippines and from Borneo would be very welcome for getting a better idea of the distribution of the forms and their true systematic status. The total number of specimens examined for the present study is limited, viz. 230, originating from 21 different islands and continental countries.

The new subspecies from New Guinea is presumably a near relative of *P. carinifrons scutellatus* Turner (NE Australia). The former is very dark and in the latter the pronotum is often also darkened in both sexes, sometimes even completely black.

In 1939, K. B. LAL described *Psenulus sinclairi* from Bombay, apparently from one single male. I was not able to examine the holotype but from LAL's drawing it is evident that his species belongs to the group of *P. pulcherrimus* and is closely allied to *P. carinifrons*. From South India a single male of *P. carinifrons* is known which may be a different subspecies, as the puncturation of the scutum is coarser than usual. More material of both sexes from these localities is necessary to determine the status of these males.

A key to all the East-Asiatic and Indo-Australian species of the group, is given below. It is followed by a discussion of most of the forms, and some new data on

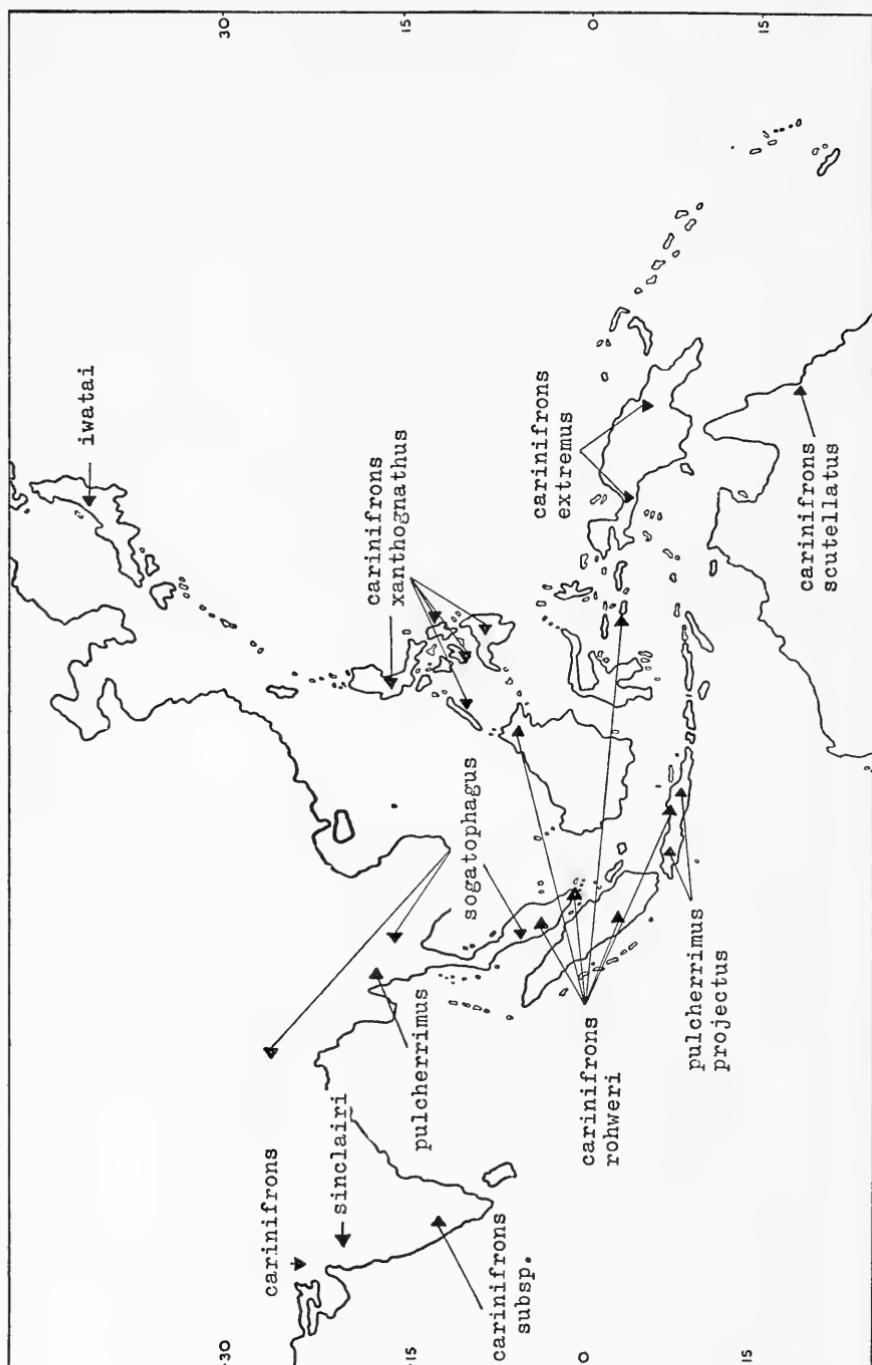


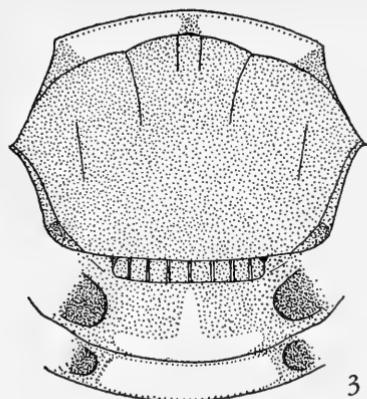
Fig. 2. Distribution of species and subspecies of the group of *Ptenulus pulcherimus*

their distribution which became available after 1962; and finally, the description of the new subspecies.

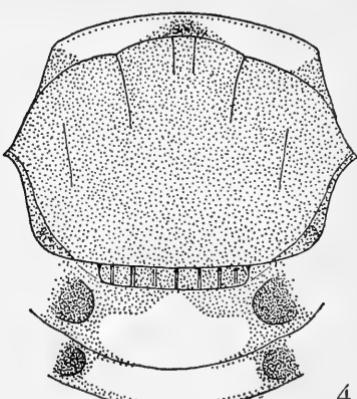
I am very much indebted to Dr. C. R. BALTASAR, Bureau of Plant Industry, Manila (BPIM), Dr. G. R. FERGUSON, Scarsdale, New York (FERG), Prof. Dr. K. IWATA, Hyogo University of Agriculture, Sasayama (HUA), Dr. K. V. KROMBEIN, United States National Museum, Washington (USNM), Dr. M. A. LIEFTINCK, Rijksmuseum van Natuurlijke Historie, Leiden (ML), Prof. Dr. K. TSUNEKI, Fukui University, Prof. Dr. J. VAN DER VECHT, Leiden, Dr. I. H. H. YARROW, British Museum (Natural History), London (BM), and Dr. C. M. YOSHIMOTO, Bernice P. Bishop Museum, Honolulu (BISH), for their assistance and for the sending of material for study. I am also grateful to Mr. G. NIXON of the Commonwealth Institute of Entomology, who provided me with some not easily accessible literature. Special thanks are due to the authorities of the Hymenoptera department of the British Museum (Natural History) for their hospitality during the XIIth International Congress of Entomology, in July, 1964.

KEY TO THE SPECIES OF THE GROUP OF *Psenulus pulcherrimus*

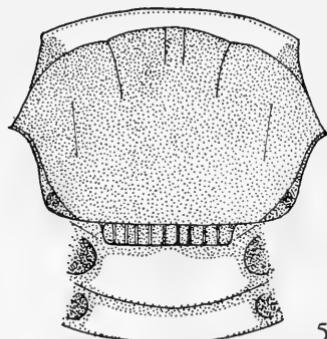
1. Scutum, often also propodeum, with yellow marks; gaster red, petiole yellowish or black. Clypeus of female triangularly projecting 2.
- Scutum and propodeum black; gaster black, at most with red spots on second tergite. Clypeus of female bluntly projecting 3.
2. Scutum laterally with elongate yellow mark above the tegulae and with median yellow spot in front of scutellum. Petiole yellowish, darkened at apex. Male unknown. (Tenasserim) *pulcherrimus pulcherrimus* (Bingham)
- Scutum only with median yellow mark in front of scutellum. Petiole black or dark brown. (Java, Krakatau) *pulcherrimus projectus* Van Lith
3. Female : mandibles quadridentate, clypeus less protruding. Male : frons below antennae indistinctly punctate, back of propodeum not very coarsely carinate (much less than in *P. carinifrons xanthognathus* and *P. carinifrons robweri*), antennal segments thicker, last segment less flattened and less pointed in lateral view. Both sexes : gaster completely black, fore and mid trochanters and femora yellow, basal $\frac{2}{3}$ of hind tibiae yellow; pronotum, scutellum and metanotum generally yellow but these parts sometimes partly or completely darkened. (Malaya, Thailand, Assam) *sogatophagus* Pagden
- Female : mandibles tridentate (including inner tooth), clypeus more protruding. Male : antennae more slender, last segment more flattened (pointed in lateral view). Both sexes : gaster not always completely black, in some forms fore and mid femora partly black or brown 4.
4. Pronotum, scutellum and metanotum black or nearly black. Gaster black. Propodeum of male not very coarsely carinate, more sloping 5.
- Pronotum, scutellum and metanotum more or less yellow, never all these parts completely black. Gaster completely black or second gastral tergite with red spots. Propodeum of male in some forms very coarsely carinate and in lateral view more angular 6.
5. Female : fore and mid trochanters, femora and tibiae yellow, basal $\frac{3}{5}$ of hind tibiae yellow. Male : fore and mid trochanters black, fore and mid



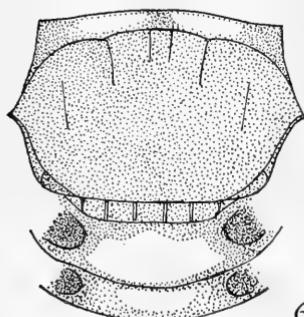
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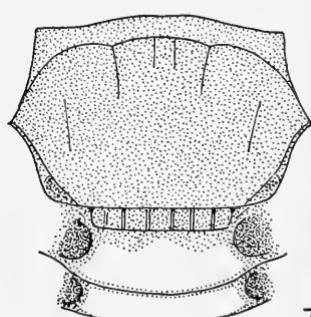
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7

Fig. 3—7. Dorsal side of thorax of two species of the group of *Psenulus pulcherrimus*, showing variation in colour-pattern. 3, *P. sogatophagus* Pagden, ♀, from Malaya; 4, *P. sogatophagus* Pagden, ♀, from Thailand; 5, *P. carinifrons scutellatus* Turner, ♀, from Halifax, NE Australia; 6 and 7, *P. carinifrons scutellatus* Turner, ♂, both Halifax, NE Australia

femora dorsally black with yellow knees, fore and mid tibiae yellow, basal half of hind tibiae yellow. (Japan) *iwatai* Gussakovskij

— Fore and mid trochanters and femora in both sexes black or brown, fore femora partly yellow below. Female : fore and mid tibiae yellow, basal $1/3$ of hind tibiae yellow. Male : fore tibiae yellow or partly darkened, mid tibiae partly brown, hind tibiae almost completely dark brown or black, base paler. (New Guinea). *carinifrons extremus* subsp. *nova*

6. Males (probably also the unknown females) with red spots on second gastral tergite (see also female of *P. carinifrons xanthognathus*). Pronotum and scutellum yellow, sometimes with a tendency to reduction, metanotum yellow ... 7.

— Gaster of male black, gaster of female black or black with red spots on second tergite 8.

7. Male with distinct red markings on second tergite. Fore and mid trochanters and femora completely yellow. Basal $6/7$ of hind tibiae yellow. Scutum finely punctate. Back of propodeum moderately carinate, gradually sloping. Female unknown. (North India) *carinifrons carinifrons* (Cameron)

— Red markings of male less distinct. Fore and mid trochanters yellow. Base of fore and mid femora black or dark brown. Basal $3/4$ of hind tibiae yellow. Scutum strongly punctate. Back of propodeum more coarsely carinate. Female unknown. (South India) *carinifrons* subsp. *nova*?

8. Pronotum, scutellum and metanotum yellow with a tendency to reduction of yellow markings, pronotum sometimes completely black or dark brown. Fore and mid femora yellow. Female : gaster black, basal half or even less of hind tibiae yellow. Male : about basal $2/3$ of hind tibiae yellow. Back of propodeum as in nominate subspecies. (NE Australia) *carinifrons scutellatus* Turner

— Pronotum, scutellum and metanotum yellow with a tendency to reduction but never completely black. Female : more than basal half of hind tibiae yellow. Male : hind tibiae usually with more yellow. Back of propodeum very coarsely carinate, in lateral view more angular 9.

9. Gaster of female with two red spots (sometimes fused) on second tergite. Male : frons raised on both sides of median carina, distinctly punctate; fore and mid femora and trochanters completely yellow or partly darkened (Mindanao!); basal $2/3$ to $5/6$ of hind tibiae yellow. (Philippines) *carinifrons xanthognathus* Rohwer

— Gaster of female black. Male : frons less raised and indistinctly punctate, fore and mid femora and trochanters completely yellow, basal $5/6$ of hind tibiae yellow (Java) or trochanters completely and fore and mid femora partly black and basal $3/4$ of hind tibiae yellow (N Borneo). (Malaya, Sumatra, Java, Kangean Islands, Buru, Borneo) *carinifrons rohweri* Van Lith

Psenulus pulcherrimus pulcherrimus (Bingham)

1896, Bingham, J. Linn. Soc. Zool. 25 : 443, ♀ (*Psen pulcherrimus*).

1897, Bingham, Fauna of British India 1 : 263.

1962, Van Lith, Zool. Vrh. 52 : 101 (*Psenulus pulcherrimus*).

The type from Amherst (Tenasserim) is in the collection of the British Museum (Natural History), London. It seems to be the only specimen known so far.

Psenulus pulcherrimus projectus Van Lith

1962, Van Lith, Zool. Verh. 52 : 102—103.

A fair number of specimens was recorded in 1962 from East and West Java and also a female from Krakatau. There are no new records.

Psenulus sogatophagus Pagden

1933, Pagden, Trans. Royal Ent. Soc. London 81 : 97—101.

1962, Van Lith, Zool. Verh. 52 : 109—110.

?1963, Tsuneki, Etienzia, Fukui Univ. 4 : 15—16 (*P. carinifrons*).

This species closely resembles *P. carinifrons rohweri*, having a black gaster and the tendency to reduction of the yellow markings of the thorax (Fig. 3 and 4). The female is easily distinguished from *P. carinifrons* by the quadridentate mandibles; the clypeus is somewhat less protruding. In the male the back of the propodeum is less coarsely carinate than in *P. carinifrons rohweri*; the last antennal segment is less flattened and less pointed than in *P. carinifrons*.

Hitherto this wasp was only known from one locality in Perak, Malaya. I received for identification from Prof. IWATA a female from Thailand which I could compare with a paratype from Malaya; undoubtedly it also belongs to *P. sogatophagus*. It was collected at Prew, 10 Jan., 1963, by A. NAGATOMI (HUA). The yellow marking on the pronotum is slightly reduced medially and laterally; the yellow marking on the scutellum is larger, covering the posterior half and medially produced triangularly so that it reaches the anterior margin (Fig. 4).

It is possible that the male mentioned by TSUNEKI (1963) from Thailand (Pakpanang), 14 July, 1961, coll. K. IWATA (HUA), belongs to the same species and not to *P. carinifrons rohweri*.

The species seems even to occur also in Assam. I have studied two males from Chabua, 29 Oct., 1943, coll. D. E. HARDY (USNM). They have a nearly black pronotum, the lower half of the pronotal tubercles is yellow whilst the scutellum and the metanotum are black except the reddish-black posterior margin. The identification should be confirmed, however, by the capture of a female in this locality.

Psenulus iwatai Gussakovskij

1934, Gussakovskij, Mushi 7 : 84—86, ♀ (*Psenulus (Eopsenulus) iwatai*).

1938, Iwata, Mushi 11 : 23—25.

1956, Tsuneki, Akitu 5 : 9, ♀ and ♂.

1958, Tsuneki, Akitu 7 : 54.

1962, Van Lith, Zool. Verh. 52 : 100.

P. iwatai is the Japanese representative of the group. It is easily recognized by the completely black thorax (except the pronotal tubercles which are brownish); the legs for the greater part are yellow. In *P. carinifrons extremus* from New Guinea the thorax is nearly completely black but the legs are much darker than in the Japanese form.

The inner tooth of the mandibles is very distinct.

I suppose that *P. iwatai* is closely allied to *P. carinifrons* and probably is a subspecies of the latter. It is advisable, however, to defer a decision until more material will become available.

The subgenus *Eopsenulus* which Gussakovskij created for this Japanese species should certainly include the whole group of *P. pulcherrimus*.

Psenulus carinifrons carinifrons (Cameron)

1902, Cameron, J. Bombay Nat. Hist. Soc. 14 : 288—289, ♂ (*Psen cerinifrons*).

1962, Van Lith, Zool. Verh. 52 : 103—104.

There are two males in the British Museum (Natural History), collected by Col. C. G. NURSE. One is the holotype (no. 21.834) bearing the label "Deesa 6.98"; the paratype is labelled "Deesa 6.97". Deesa is situated in Gujarat, India.

In the holotype the red anterolateral parts of the second gastral tergite are confluent; in the paratype these red markings are well-separated. The fore and mid trochanters and the fore and mid femora are completely yellow, the hind tibiae are for the greater part yellow, only about the apical seventh part somewhat brown.

The female is unknown.

P. sinclairi Lal from Padegaon, Bombay, is certainly closely related. As the collecting localities of *P. carinifrons* and *P. sinclairi* are not so far distant one from the other, further study of the latter holotype and of females from both localities would be interesting.

Psenulus carinifrons scutellatus Turner

1912, Turner, Ann. & Mag. Nat. Hist. [8] 10 : 54, ♀ (*Psenulus* ? *scutellatus*).

1916, Turner, Ann. & Mag. Nat. Hist. [8] 17 : 128 (*Neofoxia scutellatus*).

?1917, Turner, Mem. Dept. Agric. India 5 : 173 (*Neofoxia scutellatus*).

1962, Van Lith, Zool. Verh. 52 : 108 (*Psenulus scutellatus*).

In the female of this subspecies the transverse carina below the antennae is only slightly raised, but still distinct, whereas in the other forms of the group this carina is hardly visible. The course of the recurrent veins of the fore wings often varies somewhat in *Psenulus*; apparently it is also the case in this subspecies, the first recurrent vein being interstitial in the female from Halifax whilst in the female from Cairns, according to the original description, this vein ends just in the second submarginal cell. The extension of the yellow markings on the thorax is also very variable.

Female. — In the holotype from Cairns the pronotum is black, also the pronotal tubercles are black. In the female from Halifax only the outer ends of the pronotum are darkened, the pronotal tubercles are yellow.

In the female from Cairns the scutellum has a yellow band on the hind margin about half as broad as the scutellum, whilst in the female from Halifax (Fig. 5) the scutellum is almost completely yellow with the exception of a narrow anterior margin. Only the median part of the metanotum is yellow in the female from Cairns but the metanotum is completely yellow in the female from Halifax.

Male. — In the male collected by VEITCH in N Queensland the yellow band on the pronotum is somewhat reduced laterally; the pronotal tubercles are yellow. In one of the males from Halifax the dorsal yellow band of the pronotum is reduced to two long patches; in another male from this locality, collected on the same day, the pronotum is completely black (Fig. 6 and 7). In the latter specimen the yellow mark on the pronotal tubercles is slightly reduced.

In both males from Halifax the dark brown anterior margin of the scutellum is somewhat broader than in the female from this locality, especially on the sides. In the male from Cairns the fore part of the scutellum is not visible. In all males the yellow marking of the metanotum is more or less reduced laterally.

The fore and mid legs including the trochanters are yellow in both sexes. In the female about the basal half of the hind tibiae is yellow; in the male about two-thirds of the tibiae are yellow. The gaster is always completely black.

NE Australia, Queensland. Material examined : 1 ♀ (holotype, no. 21.839), Cairns, coll. R. C. L. PERKINS (BM); 1 ♀, Halifax, 30 June, 1919, coll. F. X. WILLIAMS (BISH); 1 ♂, June-July, 1918, R. VEITCH (BM); 2 ♂, Halifax, 8 and 30 June, 1919, F. X. WILLIAMS (BISH).

TURNER (1912) correctly remarked that this form, as well as *P. interstitialis* Cameron, differs from what he called the true *Psenulus*. In 1917 he also recognized *P. xanthognathus* Rohwer from Luzon as a closely allied species. I have not seen the female from Dacca (N India), mentioned by TURNER (1917) and provisionally named *P. scutellatus*, but I suppose that this will prove to be another subspecies. According to TURNER the insect from Dacca is nearer to the Queensland than to the Luzon form.

In 1962 I left the possibility open that *P. scutellatus* Turner and *P. carinifrons rohweri* Van Lith might prove to be synonymous. After the study of the aforementioned material from Australia and taking into account the difference in the sculpture of the hinder part of the propodeum in the males of the two forms, I now think that they are different subspecifically.

Psenulus carinifrons xanthognathus Rohwer (Fig. 1)

1910, Rohwer, Proc. U.S. Nat. Mus. 37 : 660, ♂ (*Psenulus (Neofoxia) xanthognathus*).
 1921, Rohwer, Phil. J. Sc. 18 : 312 (*Diodontus xanthognathus*).
 1923, Rohwer, Phil. J. Sc. 22 : 601.
 1962, Van Lith, Zool. Verh. 52 : 104—107 (*Psenulus carinifrons xanthognathus*).

This seems to be a common species in the Philippines but nevertheless the following new records since 1962 may be of interest.

Luzon : Los Baños, 2 ♀, Aug. 1916 and 1917, F. X. WILLIAMS, 1 ♂, June, 1916, F. X. WILLIAMS, 1 ♂, July, 1916, F. MUIR (all BISH); 1 ♀, Pateros, Prov. Rizal, 27 Dec., 1953, S. R. CAPCO; 1 ♀, Baguio, Mountain Prov., 5000 ft., 20 Oct., 1954, C. R. BALTAZAR; 1 ♂, Lipa City, Prov. Batangas, 15 March, 1955, C. MACABASCO (all BPIM); 1 ♀, Manila, 21 Dec., 1952, TOWNES family (FERG).

Mindanao : 1 ♀ and 1 ♂, Lake Lanao, 3 Nov., 1921, F. X. WILLIAMS; 1 ♀, Zamboanga del Norte, Manukan, 25 km S, 500 m, 18 Oct., 1959, L. W. QUATE (all BISH).

The female from Manila has completely yellow fore and mid trochanters and

femora, as seems to be the rule in the females from Sibuyan and Negros. This proves again the variability of at least one of the species.

The abovementioned specimens from Mindanao show a distinct reduction of the yellow markings, in accordance with what I have found earlier. Only the basal $3/5$ or $2/3$ of the hind tibiae are yellow. In the females the pronotum, scutellum and metanotum are completely yellow but in the male from Lake Lanao the yellow markings of the pronotum and of the metanotum are reduced laterally, whilst the scutellum is darkened anteriorly. There is some difference in the extension of the red spots on the second gastral tergite, which are confluent in the female from Zamboanga del Norte, but separated, indistinct, and much darker in the female from Lake Lanao.

Psenulus carinifrons rohweri Van Lith

1962, Van Lith, Zool. Verh. 52 : 108.

This subspecies differs from the Australian *P. carinifrons scutellatus*, in which the gaster is also completely black in both sexes, by the larger extension of the yellow colour on the hind tibiae and by the more coarsely carinated back of the propodeum of the male.

Although this form has not been collected in large series it does not seem to be very rare; it has a comparatively large area of distribution, covering Malaya, Sumatra, Java, Kangean Islands, Buru and Borneo. Here are some new records from Java and Borneo.

Java : 2 ♂, Gopeng (= Kopeng?, E Java, Res. Semarang), coll. H. H. BANKS (OUM).

North Borneo : 1 ♀, Keningan, 12—17 jan., 1959, coll. T. C. MAA; 1 ♂, SE North Borneo, Forest Camp, 9.8 km. SW of Tenom, 19 Dec., 1962, coll. Y. HIRASHIMA (BISH).

In the Bornean specimens the legs are blacker than in the wasps from Java, the Kangean Islands and Buru. In the abovementioned female and male from Borneo all trochanters are black and the basal half or even a greater part of the fore and mid femora is black whilst in the Javanese form the fore and mid trochanters and femora are yellow. About three quarters of the hind tibiae are yellow which is also less than in the more southern material. The pronotal yellow band shows some lateral and median reduction.

Because the material is too restricted I hesitate to consider the Bornean specimens as a separate subspecies and have provisionally labelled these *P. carinifrons rohweri*. It is to be hoped that a later revision, based on good series, preferably from Malaya, Sumatra and Borneo, may solve this problem.

Psenulus carinifrons extremus subsp. *nova*

Female. — Head black, scape of antennae brown, foreside partly yellow, underside of flagellum brown. Mandibles yellow except brown base and reddish-brown tips. Palpi testaceous.

Thorax and gaster black, only posterior half of scutellum and median part of metanotum brownish-black. Pronotal tubercles and tegulae dark brown. Fore and mid femora and trochanters brown, ends of femora yellow. Fore and mid tibiae yellow, basal half of fore and mid tarsi yellow. Basal third of hind tibiae paler yellow, apical thorns yellowish. Veins of wings brown.

Frons indistinctly not densely punctate, slightly convex on either side of frontal carina. Vertex shining, punctures minute, hardly visible (30 \times). Thorax shining, punctures sparse and not sharp. Back of propodeum smooth, sides with fine and densely reticulate carination.

Pubescence of face silvery, mostly appressed below antennae. Pubescence of rest of body whitish, rather dense on mesosternum, last apical sternite and apices of hind tibiae.

Male. — Fore and mid legs brown, including trochanters, but outer end of trochanters somewhat yellow, also underside of fore femora, greater part of fore and mid tibiae and fore tarsi except last segment yellow. Hind tibiae dark brown, base paler brown. Apical thorns of hind tibiae pale yellow.

Propodeum with almost smooth base behind enclosed area, back of propodeum with dense irregular carination, not as coarse as in *P. carinifrons xanthognathus*.

This subspecies is very similar to the Australian subspecies, *P. carinifrons scutellatus*, but it is easily recognized by the almost completely black thorax in both sexes. The legs are much darker than in any of the other subspecies.

New Guinea : 1 ♀ (holotype), NE New Guinea, Moife, 2100 m, 15 km northwest of Okapa, 11—13 Oct., 1959, coll. T. C. MAA (BISH); 2 ♂ (allotype and paratype), W New Guinea, near Kampong Agameda, coll. W. J. ROOSDORP (ML). According to information received from Mr. ROOSDORP the village of Agameda is situated near the Arabu River, about 10 km east of the Wissel Lakes.

Psenulus sinclairi Lal

1939, Lal, Indian J. Ent. 1 : 49—50, ♀ (recte: ♂).

Original description: "Female. — General colour of body dark. Mandibles, except teeth, which are black, scape of antennae, pronotum, fore and middle legs, except coxae and tarsi, hind tibiae except apices, a broad median transverse stripe on mesoscutellum and another narrower one on the metanotum deep yellow. Labial and maxillary palpi and fore and middle tarsi pale stramineous. The parts of antennae facing each other, tegulae, and apices of hind tarsi brownish orange. Wings clear hyaline, veins and stigma brown (Textfig. 1).

Head broad, transverse, deeply punctate, clypeus densely covered with silvery pubescence longitudinally arranged, antennae inserted a little further from the eyes than from each other, 13-segmented, scape twice as broad anteriorly as at base, pedicel hardly one-third the first flagellar segment, which is the longest, eyes large, extending from apex of clypeus to base of occiput, ocelli in middle of vertex, large, well separated from one another, forming a triangle and more or less transparent, frons sparsely pubescent, a small tuft of silvery pubescence immediately behind bases of antennae, frons faintly divided by a suture from anterior

ocellus to middle of area between antennal bases. Thorax broadest between tegulae, pronotum narrow and collar-like, mesonotum large, broad, punctate, sparsely pubescent, metanotum more densely pubescent than mesonotum, fore wing about three-fourths the length of body, of the three cubital cells, measured on the cubital nervure, the first is about twice and the second is slightly more than half as long as the third, hind wing with the cubitus originating beyond transverse median by a distance equal to the length of the transverse median, legs stout, hind tibiae with two apical spurs, a short stout one and another more than twice its length, basally pubescent. Petiole about one-third the length of abdomen, smooth and shining. Abdomen long, oval, segments with silvery white pubescence disposed in oblique curves diverging towards sides, except transverse narrow apical stripes of segments II, III and IV, ovipositor short. Length 7 mm.

Holotype obtained from the burrow of a stem borer in sugar cane at Padegaon, Bombay. Coll. G. S. KARKHANIS. (C.S. 79. 5.III.1937). It is deposited in the Pusa collection (H/7481).

Unfortunately I did not have the opportunity to examine the holotype. From the description and from the drawing representing the whole wasp ($\times 9$) it is evident that it is a male, not a female; the author must have been misled by the gastral spine.

There is no doubt that this wasp is closely allied to *P. carinifrons*. The localities where *P. sinclairi* and the holotype of *P. carinifrons* have been found are not very distant. The description does not say anything, however, about the red parts of the second gastral tergite which are conspicuous in the nominate form. If the gaster is indeed fully black it is probable that the male described by LAL is a distinct subspecies of *P. carinifrons*. It certainly is also closely related, perhaps even identical with the male from Coimbatore mentioned in this paper as a probable subspecies of *P. carinifrons*. I prefer to defer a decision until also the females of these forms are known; an examination of the mandibles of the females would then be necessary to ascertain whether these are quadridentate as in *P. sogatophagus* or tridentate as in the other forms of the group.

Psenulus carinifrons subsp. nova?

A male from South India differs from the nominate subspecies in the following details: the base of the second tergite is indistinctly reddish coloured. Pronotum dorsally completely yellow. Basal half of fore and mid femora black or dark brown (trochanters yellow). The apical fourth of the hind tibiae is dark brown. Scutum strongly punctate. Frons slightly stronger punctate than in nominate subspecies.

The carination of the back of the propodeum seems to be coarser, but this part being covered by the wings, a good comparison was not possible.

As only one specimen is available and therefore only one sex could be studied, it seems to be premature to separate this form, although the strong puncturation of the scutum will probably prove to be a good character. The darkening of the fore and mid femora may be less important as this often also occurs in the Philippine subspecies *xanthognathus* whilst I have seen one or two females with completely yellow trochanters and femora. Also in *P. carinifrons rohweri* the colour of fore

and mid femora may vary. In how far this is related with insular isolation remains an interesting subject for later study after sufficient material would become available. For the present we shall have to be contented with the few specimens scattered over collections in the Old and in the New World.

Apart from the somewhat reddish second gastral tergite this subspecies closely resembles *P. carinifrons rohweri*. However, the scutum of the latter form is much finer punctate. Also *P. carinifrons xanthognathus* is closely allied but also has a slightly weaker puncturation of the scutum and the frons is more convex.

It is possible that the specimen from Coimbatore and *P. sinclairi* Lal from Bombay — no females from either locality are available — are identical but unfortunately I could not study the holotype of the latter form.

South India : Coimbatore, Sept., 1955, coll. P. S. NATHAN (FERG).

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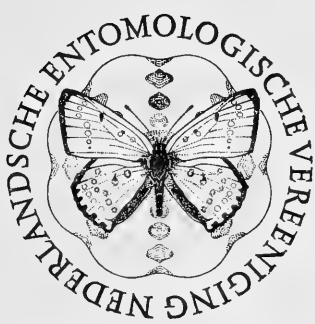
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A. DIAKONOFF. — Records and descriptions of South Asiatic Microlepidoptera, p. 49—88, Fig. 1—44, T. 1.

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Abstract

In this paper two genera and 22 species of Microlepidoptera from South Asia, belonging to the families Tortricidae, Xyloryctidae, Oecophoridae and Ethmiidae are described as new, viz. *Cimeliomorpha* g.n. (type: *Copromorphora cymbalaria* Meyr.), *Thymiatriis seriosa*, *scolia* and *microloga*, *Coenorycta plutotera*, *anholochrysa* and *acrostega*, *Odites sphaerophyes*, *Casmara regalis*, *phobographa*, *uniata*, *rufipes*, *rhodotrichys*, *kalshoveni*, *Tonica syngnoma*, *pharmacis*, *centroluta*, *peripsacis*, *melanoglypha*, *Ethmia submersa*, *Agrioceros subnota*, *Chrysethmia* g.n. *hypomelas* (type) and *neogena*. One new name (*Cryptophasa antalba*, Xyloryctidae) is proposed and three noteworthy species are recorded (Xyloryctidae, Glyphipterygidae and Oecophoridae); finally a lectotype is selected for *Tonica effractella* (Snellen, 1879), while the genus *Tonica* Walker, 1864, is treated more extensively.

Wing neurulations and heads of the new genera and genitalia of the new species, where available, of the two sexes, are figured.

When studying several collections of South Asiatic Tortricoid Microlepidoptera I encountered striking, apparently new, species from other families. Some were so fascinating that I described them on the way. Besides, several descriptions of Xyloryctidae have been made, preliminary to an intended revision of this family; as other duties will delay that revision, I prefer to publish now the descriptions already made.

The material treated in this paper originates from the British Museum (Natural History), London (BM), and from the Leiden Museum (LM). Of especial interest is the excellent material, collected by my friend, the late J. P. A. KALIS, in 1937, in the hardly ever searched regions of Western Central Celebes, and in 1938, in southwest Celebes; it was preserved in the Rothschild Collection, Tring, and is now transferred to London.

I am indebted to the Trustees of the British Museum (Natural History) for the permission to work their material, to retain a few duplicates for the Leiden collection, and to publish the results in the present series. Furthermore I am very grateful to the following gentlemen for their kind assistance in many ways during my studies at the British Museum and at Tring: Messers. W. H. T. TAMS, J. D. BRADLEY, P. E. S. WHALLEY, M. SCHAFER, W. TREMEWAN and D. CARTER. Where not otherwise indicated, the material is in the Leiden Museum.

Some of the figures, made by Mr. A. C. M. VAN DIJK, have been financed from a grant for which I am indebted to the Netherlands Organisation for Tropical Research (WOTRO). Other drawings have been made by Mr. W. BERGMANS, of this Museum, and by the author.

Two genera and 22 species are described as new and three species are recorded below. A lectotype for *Tonica effractella* (Snell.) is selected.

TORTRICIDAE, LASPEYRESIINAE

Cimeliomorpha gen. nov.

Fig. 1

Head with loosely appressed scales, roughish on vertex. Ocellus posterior. Proboscis absent. Antenna in male minutely ciliate. Palpus moderate, ascending, appressed to face, median segment thickened throughout with scales roughish along lower edge, apex narrowed, terminal segment moderate ($1/3$), obtuse. Thorax smooth. Posterior tibia normal.

Fore wing oblong-truncate, apex and termen rounded. Vein 2 from $2/5$, 3 from angle, 3—8 distant, 7 to termen, 8 from angle, 9 close to 8, 10 slightly closer to 9, 11 from just before middle. Upper parting vein from halfway between 10 and 9 to above base of 7, lower parting vein from towards base to below base of 5.

Hind wing with a cubital pecten, broadly semioval. Vein 2 from $1/3$, 3 and 4 connate from angle, 5 distant and only slightly curved throughout, 6 and 7 separate, little approximated towards base.

Male genitalia. Tegumen rounded, pedunculi with triangular frontal lobes. Uncus absent. Tuba analis sometimes with a bifid top, halves robust and rounded. Socius, a broad and flat lobe, appressed and pending. Valva with a deep excision, sacculus narrowly oblong-oval and simple, cucullus long, narrow, curved, with an apical spine. Aedeagus diversely shaped, subcylindrical.

Female genitalia. 7th sternite simple, slightly sclerotized. Ostium not modified, concealed behind it. Colliculum, a small dark ring, open ventrally, origin of ductus bursae granulate. Signum, a small slightly concave granulate sclerite.

Type-species, *Copromorpha cymbalaria* Meyr. (Assam).

A genus of several brilliantly marked species which need a revision. So far regarded as two species, "*Laspeyresia*" *novarana* Feld. & Rog. and "*L.*" *cymbalaria* Meyr.

A photograph of the male genitalia of the type-species was published by CLARKE, 1958, Meyrick's Types, vol. 3, t. 216 fig. 1a.

XYLORYCTIDAE

Thymiatris seriosa spec. nov.

Fig. 2

♂ 60—65 mm. Head ochreous-tawny. Palpus ochreous-tawny, slightly mixed with brown externally; median segment long, obliquely ascending, by far exceeding vertex, moderately broad, hardly dilated, along apical fourth slightly curved upwards; with appressed scales, roughish only towards apex below; terminal segment rather slender, straight, $1/2$, pointed. Thorax (greasy) dark purple, collar, tegulae except inner edge and a median suffused spot, whitish (more so in paratype). Abdomen and legs dark glossy brown, spines on tergites little showing, brownish-orange.

Fore wing oblong, narrow, moderately dilated, costa curved at base, faintly

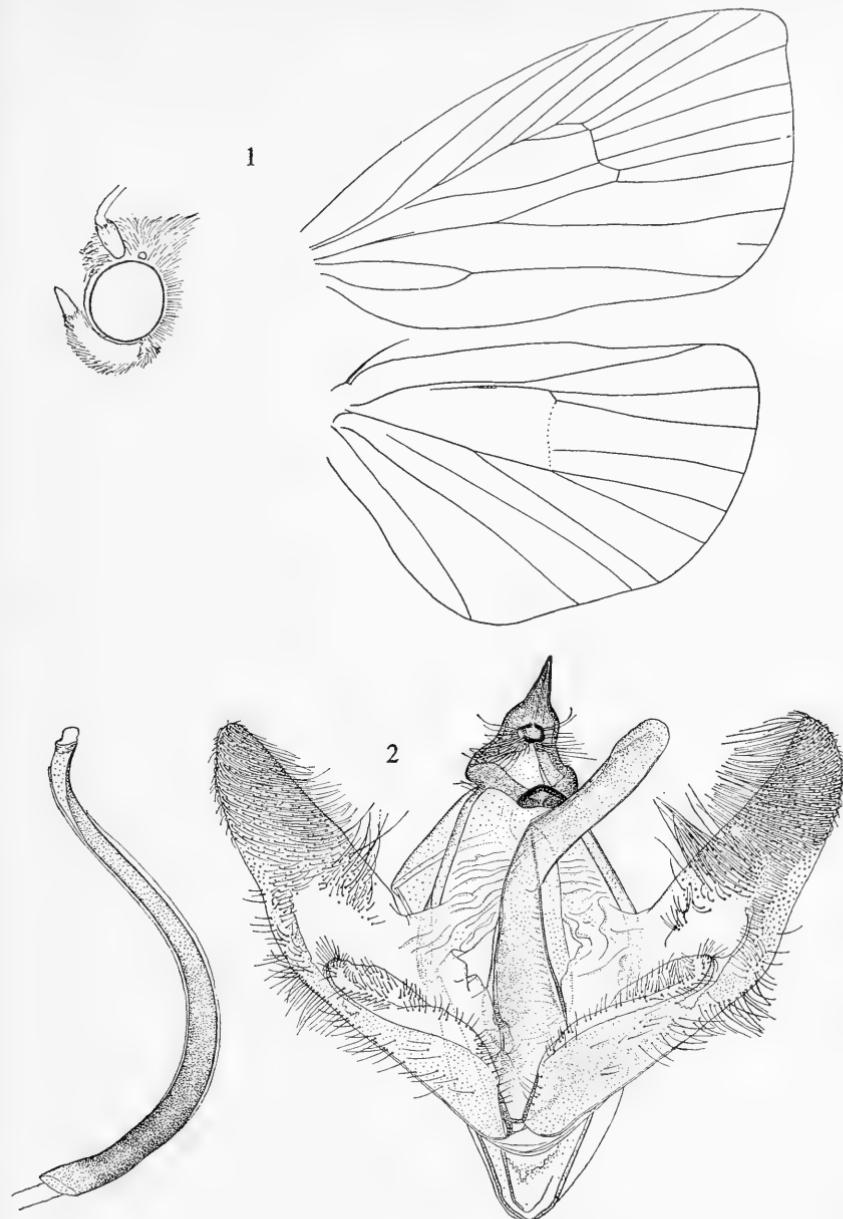


Fig. 1. *Cimeliomorpha cymbalora* (Meyrick), comb. nov., ♂, head and wing neuration.
 Fig. 2. *Thymiatriis seriosa* spec. nov., ♂, holotype, genitalia; left, aedeagus

concave in middle, almost straight, apex rounded, termen rounded, little oblique. Dark brownish-purple, with a silvery gloss, moderately mixed with whitish except along costa; this mixing more distinct below the line formed by the upper edge of cell and veins 7 + 8; edges of cell, a broad vertical bar along closing vein, and

narrow, less distinct streaks along veins beyond cell scarcely mixed with white; posterior third of costal edge indistinctly suffused with pale ochreous with three distant and very faint pale ochreous spots posteriorly, termen with a series of roundish deep orange-brown spots, confluent, so as to form a complete band, strongly constricted at interspaces between ends of veins and gradually narrowed downwards, from apex to above vein 3. Cilia light brown with a pure white basal and a dark purple subbasal line, both interrupted by small dentations emitted by terminal brown-orange fascia.

Hind wing glossy light greyish, towards edge suffused with dark fuscous, veins narrowly brownish. Cilia whitish, with light purplish broad spots opposite ends of veins, with a subbasal light purplish line becoming blackish-purple across every one of the above mentioned spots.

Male genitalia. Tegumen rather high. Gnathos constricted above middle. Vinulum long. Valva long and narrower than in other species, cucullus narrowed, sacculus $1/2$, upper edge forming a weak elongate body with a rounded top. Anellus, an extremely long tube, almost as long as valva. Aedeagus longer than anellus, slender and sinuate.

Assam, "Khasis, May, 1896, Nat. Coll." (Rothschild Bequest, BM), 1 ♂, holotype, gen. no. 4765; 1 ♂, paratype. A very distinct species.

Thymiatris scolia spec. nov.

Fig. 3

♂ 34 mm. Head rather dull light ochreous touched with tawny. Antenna brownish-fuscous, ciliations under 1. Palpus light brownish-ochreous, median segment except towards apex and terminal segment along upper edge suffused with brown; median segment, about $1\frac{1}{2}$ × as long as terminal, more spindle-shaped than in *microloga*. Thorax glossy ochreous-white, tegula towards tip mixed with fuscous. Abdomen pale ochreous-fuscous, spines forming a broad band across third tergite, golden.

Fore wing elongate-truncate, narrow, apex subrectangular, termen rounded; veins 7 and 8 stalked, 7 to apex. White, dusted with dark fuscous. A strongly suffused dark fuscous streak along costa, limited below by cell and the course of vein 9; this suffusion forming transverse short bands across cell: at $1/3$, $2/3$ and along closing vein; a broader, strongly outwards-oblique suffused band from lower edge of costal streak before its end, towards tornus, reaching halfway across wing, more distinct on veins; apex and termen with an ochreous-fuscous band, edged anteriorly by dark fuscous suffusion, broad in apex, rather abruptly narrowing downwards, reaching to tornus. Cilia (imperfect) whitish mixed with tawny and brown.

Hind wing unicolorous light fuscous-ochreous with a silky gloss. Cilia (imperfect) concolorous, with a suffused subbasal darker line dilated into faint dark spots opposite ends of veins.

Male genitalia. Closely resembling those in *T. microloga*, but differing as follows. Gnathos broader, not constricted. Valva slightly longer, much broader, top

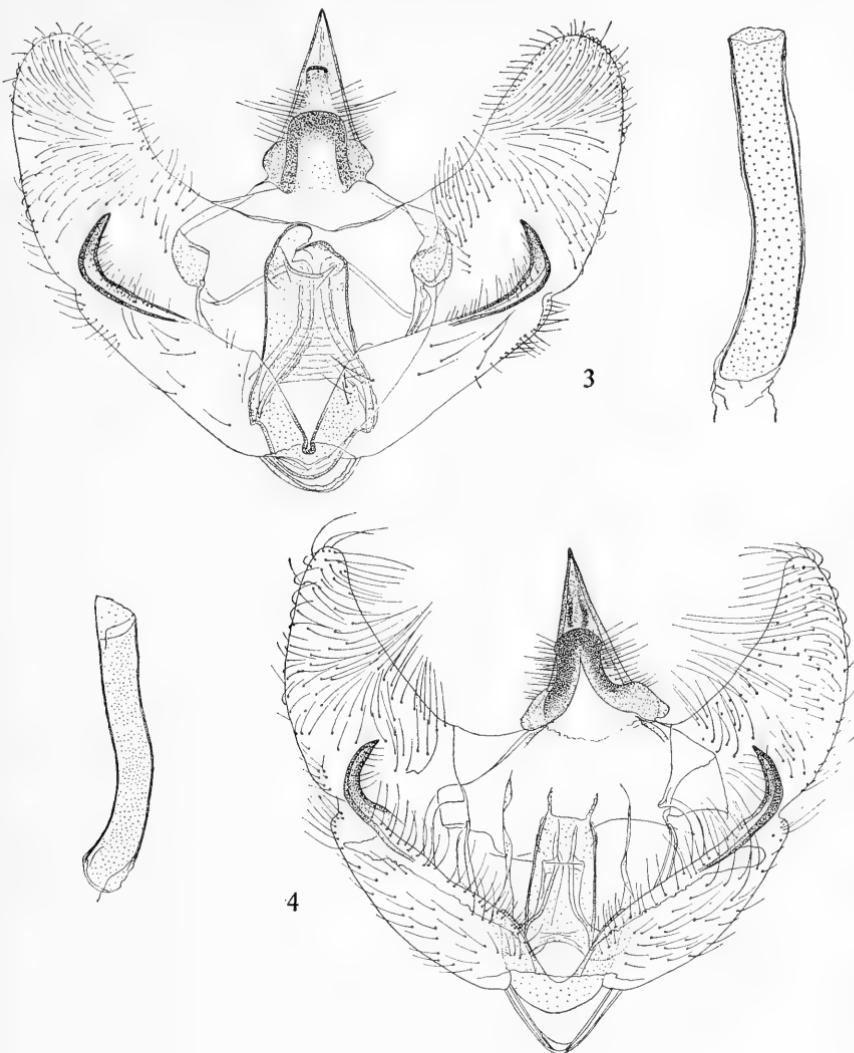


Fig. 3—4. Male genitalia of *Thymiatriis* Meyr. 3, *T. scolia* spec. nov., holotype; 4, *T. microloga* spec. nov., holotype

broadly rounded. Hook of sacculus longer and more bent. Anellus much broader. Aedeagus more robust and longer.

West Java, Soekaboemi, 1800 m, 10.XII.1935 (M. A. VAN GROENENDAAL), 1 ♂, holotype, gen. no. 4669. Superficially extremely similar to *Thymiatriis microloga* spec. nov., but immediately recognisable by different neuration and shorter palpi.

Thymiatriis microloga spec. nov.

Fig. 4

♂ 37—41 mm (holotype 38 mm). Head dull pale ochreous, collar shining pale ochreous. Antenna light ochreous, ciliations about $1\frac{1}{3}$. Palpus pale ochreous, median segment along basal half of upper side with a brown streak, by far exceeding base of antenna, $2\frac{1}{2}$ × as long as terminal segment. Thorax snow-white, dusted irregularly with dark fuscous-grey. Abdomen pale golden-ochreous, glossy, dorsal bands of spines golden-orange. Legs pale ochreous mixed with brown hairs, spurs brownish.

Fore wing narrow, elongate-truncate, costa slightly curved at extremities, gently concave in middle, almost straight, apex rounded, termen gently rounded, almost vertical. Pure white, dusted coarsely throughout with dark fuscous-grey; a continuous streak of the same colour along costa, narrowed in middle, confluent with a similar but narrower irregular streak along upper edge of cell; veins above and beyond cell, as far as vein 2, narrowly streaked with the same colour, as also is the discoidal vein; sometimes an inwardly-oblique series of short darker streaks along veins, this series running from costa before apex to dorsum well before tornus. A series of rather large pale ochreous spots on ends of veins 3—9, becoming smaller on both ends of the series, surrounded by brownish-ferruginous scales. Cilia pale ochreous with a paler base and a dark brown submedian band, posterior half of cilia rather mixed with brown, cilia in tornus white dusted with dark fuscous-grey.

Hind wing glossy ochreous-grey, along upper part of termen and in apex narrowly pale ochreous strewn with dark brown. Cilia light ochreous-fuscous, with a distinct dark fuscous subbasal narrow band.

Male genitalia. Similar to those of *T. melitacma* Meyr., but differing thus. Valva shorter, with cucullus much more narrowed and pointed, also more curved. Aedeagus half as long as in *melitacma*. Aedeagus shorter.

East Java, Tengger Mountains, Nongkodjadjar, 1300 m, 19.XI.1938 (A. M. R. WEGNER), 1 ♂, holotype, gen. no. 4628; 2 ♂, paratypes.

Closely allied to the type-species, *T. melitacma* Meyr., from India, but with the veins 4 and 5 of the fore wing separate and the genitalia different. Nearest to a new *Thymiatriis* species from the Philippines, but with the forewing more suffused and with the valva differently shaped.

Cryptophasa antalba nom. nov.

Cryptophasa proleuca Diakonoff, 1948, Treubia 19: 191, t. 6 fig. 8; nec Meyrick, 1890, Trans. Roy. Soc. S. Austral. 13: 31 (*Cryptophaga*).

As the generic name *Cryptophaga* Meyrick, 1890, is an emendation of *Cryptophasa* Lewin, 1805, I am now satisfied that the above name proposed by myself is invalid, being a junior primary homonym; therefore I am proposing the above new name for this species.

Coenorycta plutotera spec. nov.

Fig. 6

♂ 54 mm. Head pale golden-ochreous. Antenna dark brown, pectinations $2\frac{1}{2}$, light brown, finely ciliate, scape short, chestnut-brown. Palpus ascending, appressed to face, median segment straight, abruptly curved at upper third, densely scaled, scales smoothly appressed, lower edge flattened, terminal segment $\frac{1}{2}$, slightly flattened laterally, obtusely pointed; light brown, laterally suffused with dark brown. Thorax pale ochreous-golden, a complete transverse band beyond collar,

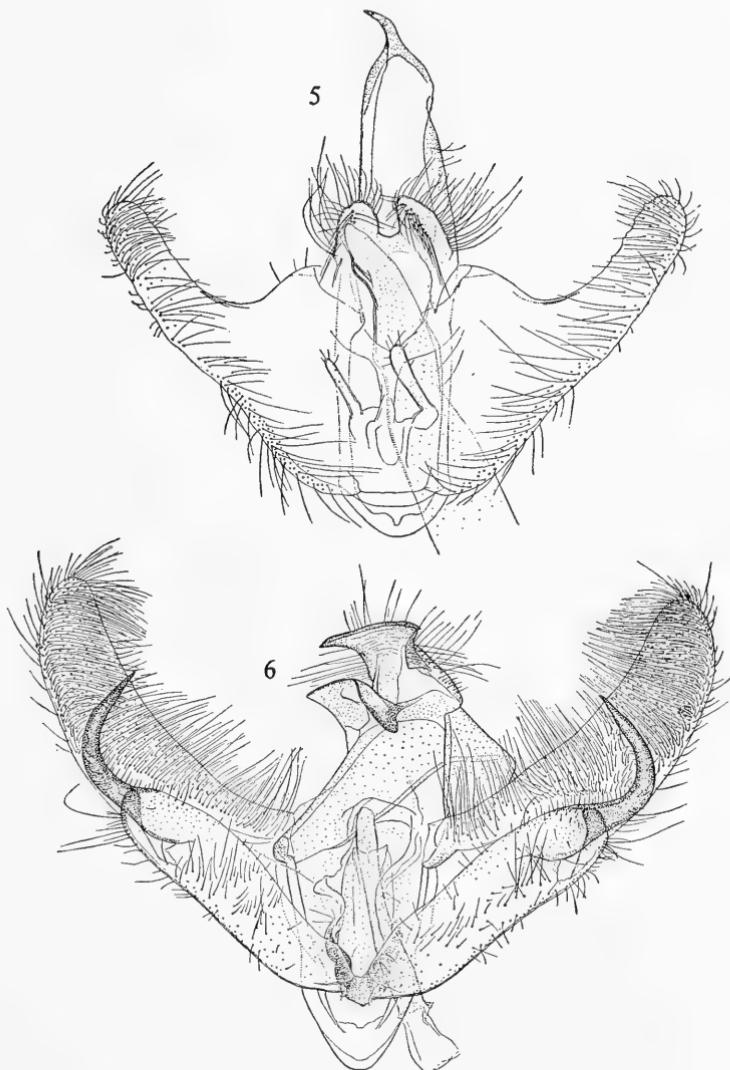


Fig. 5—6. Male genitalia of Xyloryctidae. 5, *Odites sphaerophyes* spec. nov., holotype; 6, *Coenorycta plutotera* spec. nov., holotype

light orange-golden with a metallic gloss. Abdomen pale golden, anal tuft somewhat dull, tawny-ochreous. Pectus, anterior and median legs, and posterior tarsus dark brown, posterior tibia lighter brownish, with dense but not loosely projecting hair-scales above and beneath.

Fore wing oblong, rather narrow, costa straight, hardly concave in middle, curved towards apex, moderately rounded, termen almost straight, hardly rounded. Pale ochreous-golden, costal third suffused with dark brown and with some faint bluish reflections, lower edge of suffusion becoming lighter brown. Cilia pale ochreous-golden, around apex touched with tawny and with a dark brown subbasal band there.

Hind wing and cilia pale ochreous-golden with a silky gloss, somewhat less distinct than in the fore wing; hairs over anal area long and dense, concolorous.

Male genitalia. Tegumen rather short, pedunculi triangular. Uncus porrected, flattened, top sclerotized, truncate, side angles acutely produced. Gnathos porrect, subquadrate. Valva gradually narrowed, slightly curved, rather slender, top rounded. Sacculus $1/2$, apical hook very large, strongly bent. Aedeagus slender.

New Guinea, Rook Island, VII.1913 (A. S. MEEK), 2 ♂, holotype gen. no. 4856 (BM). Nearest to *C. psammochta* Meyr., but more robust, with stouter body and slightly shorter and broader wings, longer pectinated dark brown antennae and stouter palpi. There is no trace of a discal spot on the end of cell in the fore wing, as in *psammochta*.

Coenorycta anholochrysa spec. nov.

Fig. 7

♂ 38 mm. Head whitish with a pale orange tinge. Antenna dark brown, fasciculate-ciliated, ciliations 1, white. Palpus long, little curved, appressed to face, rather slender; median segment with closely appressed scales, dark fuscous-grey, far exceeding base of antenna; terminal segment about $1/3$, pale ochreous, pointed. Thorax white with a pale orange tinge, a pale golden median spot, shoulder pale golden. Pectus suffused with rather dark brown. Abdomen glossy, golden, slightly mixed with a few dark scales, sides of abdomen with a suffused brownish streak. Legs blackish, posterior tibia with loose, projecting long hairs above and beneath.

Fore wing oblong, rather narrow, costa straight, curved before apex, apex rounded, termen rounded, moderately oblique. Glossy bright golden, costa brownish-black as far as lower edge of cell, this colour becoming suffused and lighter brown downwards, black dusting forming distinct streaks along upper edge of cell and veins 7 + 8, 9 and 10. Cilia light golden, a blackish subbasal band around apex.

Hind wing and cilia glossy bright golden-yellow, brighter than fore wing.

Male genitalia. Similar to those in *C. plutotera*, differing thus: gnathos slightly prominent in middle of frontal edge, sides distinctly folded and inbent. Valva more narrowed and pointed. Sacculus under $1/2$, top not rounded, apical hook less strongly bent.

West Celebes, Paloe, Mt. Tompoe, 2700 ft, I.1937 (J. P. A. KALIS), ♂, holotype, gen. no. 4857. Superficially very similar to the foregoing, Papuan

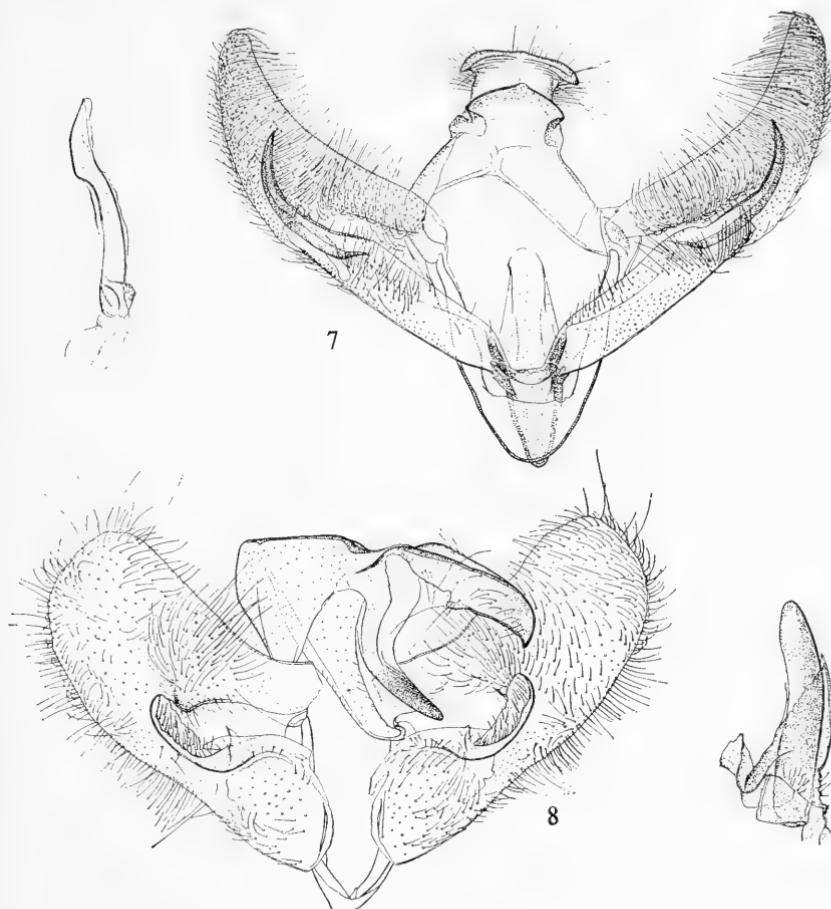


Fig. 7—8. Male genitalia of *Coenorycta* Meyr. 7, *C. anholochrysa* spec. nov., holotype; 8, *C. acrostega* spec. nov., holotype

species, but smaller, more slender, with fasciculate-ciliate antennae, hind legs entirely dark above (not only dark tarsi, as in *plutotera*), etc.

Coenorycta acrostega spec. nov.

Fig. 8

♂ 30—31 mm. Head purplish-white, glossy, sides of face suffused dark purple. Antenna purplish-white, scape light purplish, pectinations dark purple. Palpus recurved, ascending, long, median segment reaching base of antenna, terminal segment over $1/2$, pointed; sordid purplish-white. Thorax dark purple, collar and tegulae purplish-white. Abdomen orange, becoming pale towards base, suffused with brown towards apex, suffused dark fuscous bands to segments. Legs ochreous-orange.

Fore wing oblong-truncate, rather narrow, little dilated, costa hardly curved at base, straight, rather curved along posterior fifth, apex rounded-prominent, termen strongly concave, oblique. Whitish, finely irrorated with vinaceous-purple, tips of scales edged narrowly with that colour; more than costal half dull vinaceous-fuscous or purplish, edge of this colour straight to before lower angle of cell, thence gradually curved downward, to tornus, concave; this edge suffused with dark purple; apex slightly dusted with purplish-white. Cilia brownish-purple, base white, with a subbasal deep purple line.

Hind wing bright ochreous, paler and dull along costa, paler and with a golden gloss on dorsum; extreme edge of wing in apex and along termen variably dusted with deep purple. Cilia golden-ochreous, in apex and along termen variably suffused and dusted with deep purple.

Male genitalia. Uncus large and strong, triangular, top flattened laterally, beak-like. Gnathos moderate, triangularly pointed, arms sinuate, top porrect. Valva elongate-oval, little curved, top broadly rounded; sacculus $\frac{1}{3}$, upper edge forming a sinuate hollow ridge with rounded top, reaching to middle of valva. Aedeagus rather short and straight.

West Celebes, Paloe, Sidaonta, 4500 ft., VI.1937, 1 ♂, holotype (31 mm), gen. no. 4720; Paloe, Koelawi, 3100 ft., III.1937, 2 ♂, paratypes; Lindoe, Paloe, 3700 ft., IV.1937, 1 ♂, paratype (J. P. A. KALIS) (Rothschild Bequest, BM).

A distinct, characteristically coloured species.

Odites sphaerophyes spec. nov.

Fig. 5

♂ 18 mm. Head, scape of antenna and thorax pale ochreous-creamy. Antenna brownish, ciliations 3, white. (Palpi missing). Abdomen pale ochreous.

Fore wing oval, costa curved, apex and termen strongly rounded, the former indefinite. Creamy-yellowish, pale, veins a trifle darker ochreous, dorsum slightly suffused with deeper yellowish and ochreous. Second discal stigma strongly suffused, ochreous-tawny; a faint tawny suffusion on $\frac{1}{3}$ of dorsum, another, smaller, on dorsum before end of fold. Cilia very pale yellowish.

Hind wing pale, whitish-yellowish with a silky gloss, cilia concolorous.

Male genitalia. Tegumen narrow. Uncus moderate, hooked. Gnathos shaped as two hairy strong lobes. Valva with a broad base, costa very short, cucullus rather short, straight, not narrowed, top rounded. Anellus lobes clavate, rather slender, about 4 or 5 times as long as broad. Vinculum rounded.

West Celebes, Paloe, Mt. Rangkoenaoe, 900 feet, XI.1936 (J. P. A. KALIS), 1 ♂, holotype, gen. no. 6129; 2 ♂, paratypes, gen. no. 5571, 5749 (Rothschild Bequest, BM). Closely allied to *O. paracyrtia* Meyr. from Ceylon, but the genitalia are distinct: cucullus straight, gnathos lobes longer and anellus lobes much shorter in the present species.

Ptochoryctis chalazopa Meyrick, 1920

Ptochoryctis chalazopa Meyrick, 1920, Exot. Microlep. 2 : 321 (♂ ♀, Java). — B. S. Rao & Hoh Choo Chuang, 1965, Pests of Hevea : 50, T. Fig. 1, ii, i2 (shelter, larva, adult figured).

Food-plant, *Hevea*.

East Borneo, Samarinda, Muara Kaman, 50 m, XI.1950 (A. M. R. WEGNER), 1 ♂, gen. no. 4657. The single specimen is in good condition, with markings jet-black and more distinct than in the typical series from Java, in the British Museum (LM).

The original specimens, collected by W. ROEPKE, were "making curious webs ... on bark of *Hevea*."

GLYPHIPTERYGIDAE**Imma mormopa** Meyrick, 1910

Fig. 33

Imma mormopa Meyrick, 1910, Trans. Ent. Soc. Lond.: 467 (Moluccas : Banda, Amboina, ♂ ♀). — Clarke, 1955, Meyrick's Types 1 : 211. — Diakonoff, 1949, Bijdr. Dierk. 28 : 138 (*Simaethis nubicincta* syn.).

Simaethis nubicincta Meyrick, 1938, Iris 52 : 52, 86 (Java, ♀). — Clarke, 1955, Meyrick's Types 1 : 219.

This somewhat surprising synonymy became apparent to me when studying the Glyptapterygidae in the British Museum in 1946. Later I had the opportunity to compare the lectotype of *mormopa* (selected but not yet published, by Dr. J. F. GATES CLARKE) and the holotype of *nubicincta*. They are one and the same, very distinct, species.

Male genitalia. Uncus pointed, sickle-shaped. Socius short, free, subporrected. Valva strongly concave, sacculus thickened, moderately haired, unarmed; cucullus curved outwards, narrow, strong. Lobi anales broad, flat, tops rounded and dilated. Aedeagus moderate, sinuate (gen. no. 4791).

Further material studied. Moluccan Islands, Banda, VIII.1892 (W. DOHERTY). 1 ♂. West Java, Mt. Gedeh, 2500 feet, 1934 (J. P. A. KALIS), 1 ♂ (Rothschild Bequest, BM).

OECOPHORIDAE**Casmara** Walker, 1863

Casmara Walker, 1863, List Lep. Het. Brit. Mus. 28 : 518 (Type-species, *Casmara infaustella* Walker, North India) — Meyrick, 1922, Genera Ins. 180 : 60. — Fletcher, 1929, Mem. Agr. Ind., Ent. 11 : 40. — Gaede in Bryk, 1939, Lepid. Catal. 92 : 400. — Clarke, 1963, Meyrick's Types 4 : 134.

Male genitalia. Tegumen rather small, subconical, pedunculi being broad, and rounded longitudinally. Uncus little curved, slightly constricted in middle, densely haired and sclerotized. Gnathos strong, sclerotized and rigid, arms short, point

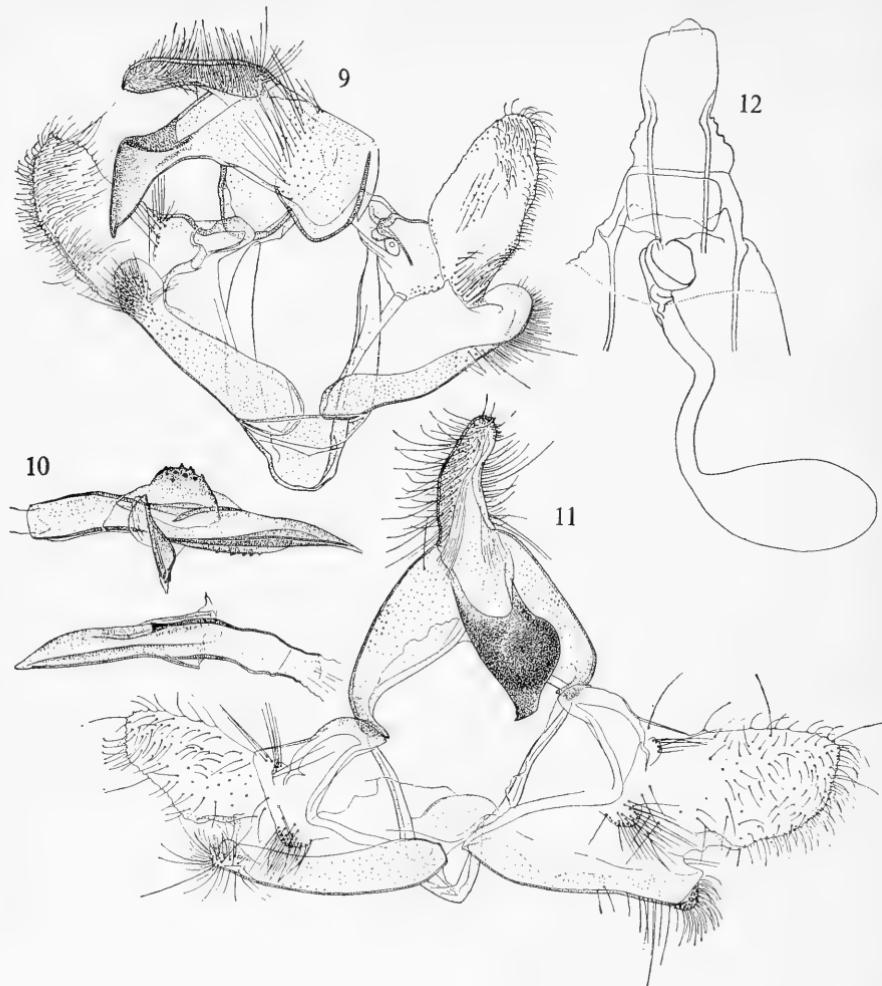


Fig. 9—12. Genitalia of Oecophoridae. 9, *Casmara regalis* spec. nov., ♂ holotype; 10, the same, aedeagus; 11, *C. uniata* spec. nov., ♂ holotype, left: aedeagus; 12, *C. kalshoveni* spec. nov., ♀, allotype, a sketch

more or less triangular, sometimes thickened and prominent in centre. Vinculum large, elongate. Valva short, broad at base, sacculus over 1, top forming a free lobe, dentate or simple, cucullus thinly haired, suboval. Aedeagus sclerotized, straight, acutely pointed, with longitudinal ridges, sometimes denticulate, and a lateral denticulate prominence.

Female genitalia. Eighth sternite moderately sclerotized, densely haired along upper edge. Ostium, a diversely shaped oblique cup, colliculum very short. Ductus and corpus bursae simple.

The genitalia show only slight specific differences, which are sufficient, though, for discrimination of species. Superficial differences usually are more striking.

The species are rather similar, very large insects with narrow, long wings and long legs, often thickened with brushes or whorls of dense scales. The scaling of the palpi and of the legs show differences which must be only specific, for the neuration and the genitalia are extremely similar in all the species.

Casmara regalis spec. nov.

Fig. 9—10

♂ 46—59 mm. Head and thorax creamy-white, strongly mixed with dark fuscous, except on forehead and face, thorax with a white apex. Antenna whitish dotted with dark fuscous, ciliations $1\frac{1}{2}$, blackish, scape creamy, fuscous on basal half, pecten creamy. Labial palpus long, median segment far exceeding base of antenna, rough beneath, but not tufted; terminal segment about $\frac{1}{2}$, spindle-shaped, rather thick, pointed, roughly dilated below top; creamy, densely mixed with dark fuscous, fringe at apex below white, terminal segment white, black above, with a subapical black band. Abdomen bronze-purplish, posterior edges to segments bluish-black, tergites 4—6 with broad bronze-purplish bands of fine spines, anal tuft brightly ochreous. Legs, whitish or creamy mixed with dark fuscous, posterior tibia bluish-black spotted with white.

Fore wing narrow, oblong. Vein 11 from about $\frac{1}{3}$ of cell. White ground colour almost entirely obscured by dense light brown dusting, partly mixed with darker fuscous-brown and mixed over this again with white; black suffused streaks between veins and a curved longitudinal streak above dorsum; a large transverse-subrectangular brown spot on end of cell, suffusedly and narrowly edged with creamy; some irregular white spots and dots, tending to form horizontal rows posteriorly, not reaching apex and termen; independent from these a subterminal series of white strigulae parallel to wing margin; two pale ochreous spots on costa before apex. Cilia pale fuscous, glossy, with a white basal line and a black subbasal band, lower half of cilia with white bars, three bars more distinct and larger towards tornus.

Hind wing deep purple-black, apical sixth white, with a narrow black marginal line interrupted on veins, veins 6 and 7 narrowly black; tuft on vein 1a bluish-black. Cilia purple-black, around apex and along upper half of termen white.

Male genitalia. Gnathos pointed, upper surface concave, lower part in profile slightly convex. Sacculus gradually dilated and rounded basad, its apex with a semicircular simple lobe. Cucullus somewhat irregularly semioval, not distinctly impressed above middle. Aedeagus strong, dentate beyond middle above, median prominence moderately dentate.

Female unknown.

The genitalia show a remarkably close relationship with *C. kalsboveni* sp. n. described below, which superficially is entirely different.

C e l e b e s. Southwest Celebes, Pangean near Maros, 2000 feet, III.1938, 1 ♂, holotype, gen. no. 4858; 4 ♂, paratypes, gen. no. BM 5546 (J. P. A. KALIS) (BM). — North Celebes, Minahassa, Tonsea Lama, 16.V. (VAN BRAECKEL), 1 ♂, paratype (LM). — Northwest Celebes, Goeroepahi, 13.I.1917 (W. KAUDERN), 1 ♂, paratype (LM).

Casmara phobographa spec. nov.

Fig. 23—24, 28

♂ 35 mm. Head pale ochreous, strewn with fuscous. Palpus whitish strongly mottled throughout with dark fuscous. Antenna pale ochreous, basal fifth banded with brown above; ciliations over 1. Thorax pale ochreous densely suffused with fuscous-brown, tegulae only strewn with that colour. Abdomen pale ochreous densely strewn with fuscous-purple, posterior halves of segments with a median band of brassy bristles, beyond these pale golden ochreous, anal tuft purple-brown, mixed above with pale ochreous. Legs: anterior pale ochreous densely dusted and mottled with dark fuscous, tibia and each joint of tarsus strongly dilated by whorls of scales, median leg similarly dilated, femur bronze-brown with a black ring, tibia much dilated, rough, fulvous-ochreous, tarsus ochreous-whitish; posterior leg pale ochreous, strongly mixed with fuscous-brown except above, tibia with two very large rounded loose whorls of scales, in middle outwardly and at apex above, upper side with projecting fine and long hairs, tarsus dilated with large whorls projecting above, one on each segment.

Fore wing long and narrow, oval-sublanceolate, costa curved at base, concave in middle, apex rounded, termen rounded, very oblique. Glossy pale ochreous, strewn with light and dark brown. A slight longitudinal raised tuft along and below costa near base, resembling a costal fold. Costa coarsely suffused with dark brown, along less than posterior half with five suffused silvery-white spots, becoming smaller posteriorly, ultimate subapical; four smaller similar spots along termen, lower fasciate; a large prostrate-X-shaped dark brown mark along median third of lower edge of cell, posterior upper leg followed by a small inwards-oblique pale transverse mark in cell; anterior extremity of the X forming a slightly raised transverse crest; a dark brown thick bar of slightly raised scales along closing vein; indistinctly continued with upper posterior leg of the X; a faint white suffused transverse mark edging lower half of closing vein posteriorly, wing beyond this from tornus to vein 8 and as far as termen, stronger suffused with dark brown except an irregular conspicuous white patch in its centre, before and slightly above middle. Cilia deep bronze-fuscous, lower half along posterior part of costa, in apex and along termen barred with blackish-brown, bars becoming shorter along costa towards apex, broader again from apex to tornus.

Hind wing glossy light ochreous, dusted evenly with purple, more so towards dorsum, veins brightly purple. Cilia light golden-ochreous, a purplish suffused submedian shade, well-defined around apex and along upper half of termen.

♀ 48 mm. Similar to male, but entirely intact and therefore markings more distinct. Denser strewn with purple; a pale round basal patch, its edge strongly rounded and raised; this patch whitish-ochreous, little dusted with very pale purplish; X-mark reduced to a streak along fold below median third of cell, continued as an oblique shadow across cell to $\frac{3}{4}$ of upper edge, followed by an inwards-oblique small white transverse mark; a dark purple streak below posterior fourth of upper edge of cell and below vein 8 to beyond furcation with 7; mark on closing vein broad, blackish-purple, crescentic and edged on both sides with white, posterior edge extending downwards to fold before its end, area between

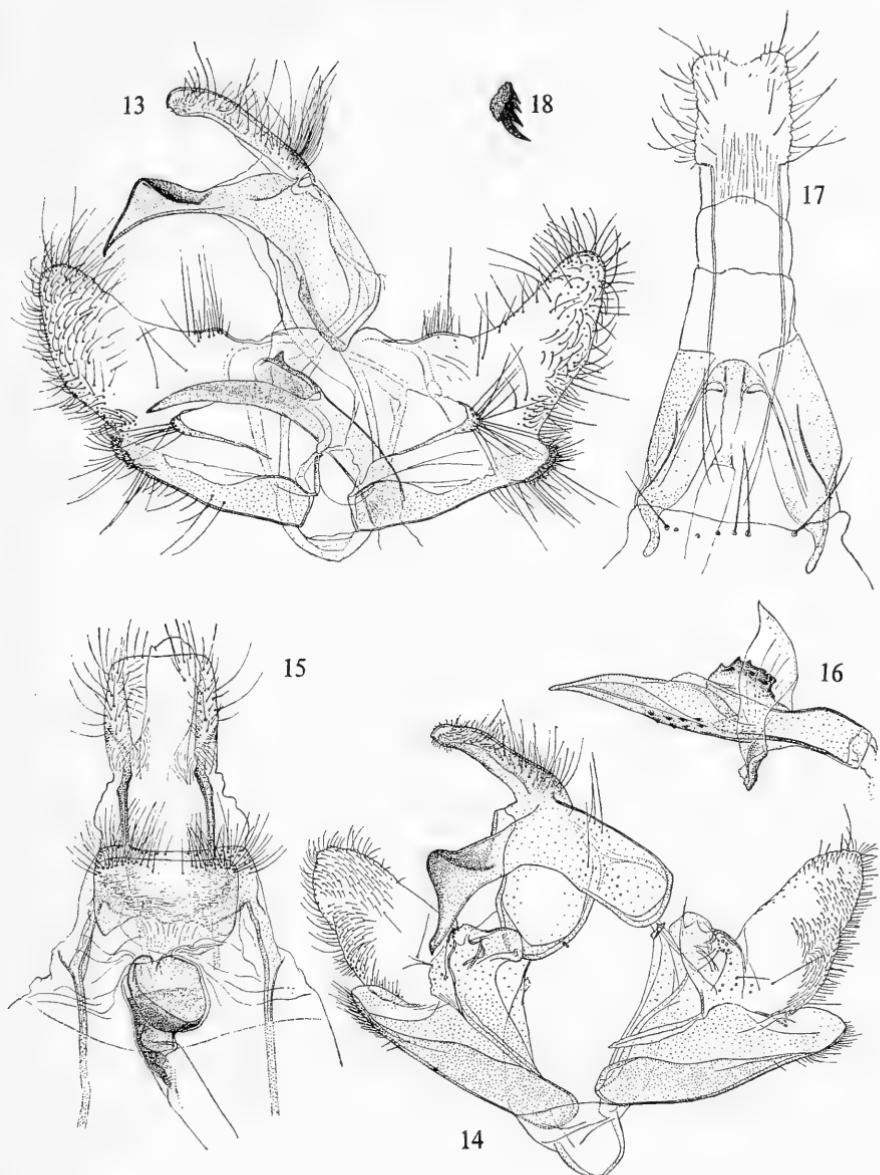


Fig. 13—18. Genitalia of Oecophoridae. 13, *Casmara rhodotrichys* spec. nov., ♂ holotype; 14, *C. kalshoveni* spec. nov., ♂, holotype; 15, the same, ♀, allotype; 16, the same, aedeagus; 17, *Tonica effractella* (Snellen), ♀, lectotype; 18, the same, signum

cell and termen deeper dark purple, whitish patch shifted slightly more anterad and costad; some white scales below $\frac{1}{3}$ of costa. Cilia darker suffused.

Hind wing and other parts colored as in male, legs scaled in the same way.

Male genitalia. Uncus rather short, shorter than gnathos. Gnathos strong, with a round central hunch, upper surface coarsely punctulate; frontal profile straight. Valva with sacculus sclerotized throughout, free lobe upcurved, rigid, with a sclerotized marginal blade; costa sclerotized; a club-shaped weak and bristly process in middle of disc resembles a pulvinus; cucullus rhomboidal, angles rounded. Aedeagus gently curved, some three small thorns in middle, an acute ridge along dorsum of apical third.

Female genitalia. Eighth segment sclerotized, densely haired along posterior edge, sternite with a deep emargination. Ostium, colliculum membranous and simple.

Sumatra, Fort de Kock, 920 m, IV.1921, 1 ♂, holotype, gen. no. 6127; II.1922, 1 ♀, allotype, gen. no. 6128 (E. JACOBSON). Nearly allied to *C. exculta* Meyr., differing in the light tawny-vinaceous colour of dorsum not extending above $\frac{2}{3}$ of wing, bordered by black discal markings (streak along upper edge of cell).

Casmara uniata spec. nov.

Fig. 11

♂ 32—41 mm (holotype 37 mm). Head pale ochreous, sides of face blackish, roughish scales around bases of antennae and tufts on vertex, roughly spreading, mixed with black; posterior edge of head with roughish scales, mixed with blackish. Antenna pale ochreous, scape suffused with fulvous; ciliations over 1. Palpus ochreous-whitish, strewn with black scales, denser strewn along lower edge and apex; apical segment with a couple of black scales in middle. Thorax whitish-ochreous, tegulae slightly brighter ochreous; moderately and coarsely mixed with fuscous. Abdomen dark fuscous, posterior edges of segments with pale ochreous bands, preceded by bands of brassy bristles. Legs whitish, coarsely strewn and mixed with black; anterior tibia dilated, brushy towards base, tarsus less dilated; median tibia with a median and an apical fan-shaped brush, median tibia almost white, dilated with sparse loosely projecting hair-scales; posterior tibia with similar, but less dense fan-shaped brushes; apical edge of all brushes black.

Fore wing long and narrow, ovate-lanceolate, subacute, termen rounded and very oblique. Creamy, partly strewn with bright fulvous scales, markings dark fuscous. Base of costa with a subcostal curved ridge of moderately rising loose scales, making impression of a costal fold; this ridge at base and towards apex mixed with blackish; costa from beyond this ridge to $\frac{4}{5}$ with a broad streak of fuscous dusting, becoming narrow posteriorly and edged below by fulvous suffusion; this streak containing five whitish-creamy marginal streaks becoming shorter posteriorly, ultimate small, triangular, subapical; basal patch indicated by a rounded edge of sparse dark dusting at $\frac{1}{4}$, centre of patch creamy, unobsured; a large black inwards-oblique patch in middle of disc at $\frac{1}{3}$, from upper edge of cell to below fold, upper and lower edges horizontal, anterior concave, posterior with a notch above fold, strongly rounded above it, less so below; this patch broadly

edged with creamy on both sides; a bright fulvous-tawny suffusion in middle of wing from costal streak to dorsum, extended along this to tornus and to basal patch, but anteriorly becoming paler and ill-defined; an inwards-oblique transverse spot along closing vein, upper edge truncate, lower rounded, edged with whitish-creamy on both sides, posterior edge extended as an oblique streak to tornus; posterior third of wing from below costa densely suffused with dark fuscous, including an ill-defined central whitish spot well beyond cell and a series of five creamy subterminal transverse strigulae between veins, upper one ill-defined. Cilia fuscous, basal half dark fuscous, pale bars opposite ends of veins.

Hind wing pale ochreous densely strewn and suffused, except along costa, with bronze-fuscous. Cilia pale ochreous with a dark fuscous basal third.

Male genitalia. Similar to those of *C. exculta* Meyr. but cucullus lower and very oblique, not quadrate as in that species, and sacculus with the free top very short.

West Celebes, Paloe District, Sidaonta, 1500 feet, VII.1937, 1 ♂, holotype, gen. no. 4861 (LM). Paloe, Loda, 4000 feet, V.1937, gen. no. BM 5547, 3 ♂, paratypes. Paloe, Lindoe, 3900 feet, IV.1937, 4 ♂, paratypes. Paloe, Goe-noeng Tompoe, 2700 feet, I.1937 (BM). Central Celebes, 1937, 2 ♂, paratypes (BM). All collected by J. P. A. KALIS. 11 ♂.

An elegant species, superficially resembling *Epimecyntis eschatopa* Meyr., from Sumatra, closely and identified accordingly. The neuration, however, is different and the genitalia are distinct. Actually nearest to *C. exculta* Meyr.

Casmara rufipes spec. nov.

Fig. 35

♂ 39 mm. Very similar to *C. uniata* spec. nov., from West Celebes, but differing as follows. Anterior tibia and tarsus densely suffused with dark fuscous throughout; median tibia strongly expanded, shaped as a single thick conical brush of rather smoothly appressed and finer fulvous scales, with a few slender, bristle-like long and black, strongly projecting scales, median tibia little dilated, white mixed with fulvous; posterior tibia strongly roughly expanded along basal half and with a fan-like apical brush; pale ochreous densely mixed with blackish, tips of tufts black; posterior tarsus expanded towards middle, spindle-shaped, tawny-fulvous.

Fore wing denser dusted throughout with purplish-fuscous (median fulvous area as in *uniata*, absent); marginal costal spots whiter, more rounded; subterminal strigulae whiter, longer and almost interconnected, each followed by a blackish spot; white central spot beyond cell large and conspicuous. Hind wing paler, semi-pellucent in centre, denser suffused with fuscous along vein 1a. Otherwise as *uniata*.

Male genitalia. Tegumen, uncus and gnathos considerably sclerotized. Gnathos strongly swollen, almost angularly prominent, point acute. Valva with free top of sacculus subacute, almost triangular, with a marginal ridge; cucullus with a straight or even slightly concave costal edge, lower edge more or less gradually rounded, without a distinct prominent angle (as present in *C. exculta*). Aedeagus with a series of four rigid thorns, apical minute, basal large and bifid (in *exculta* there is an additional larger apical thorn).

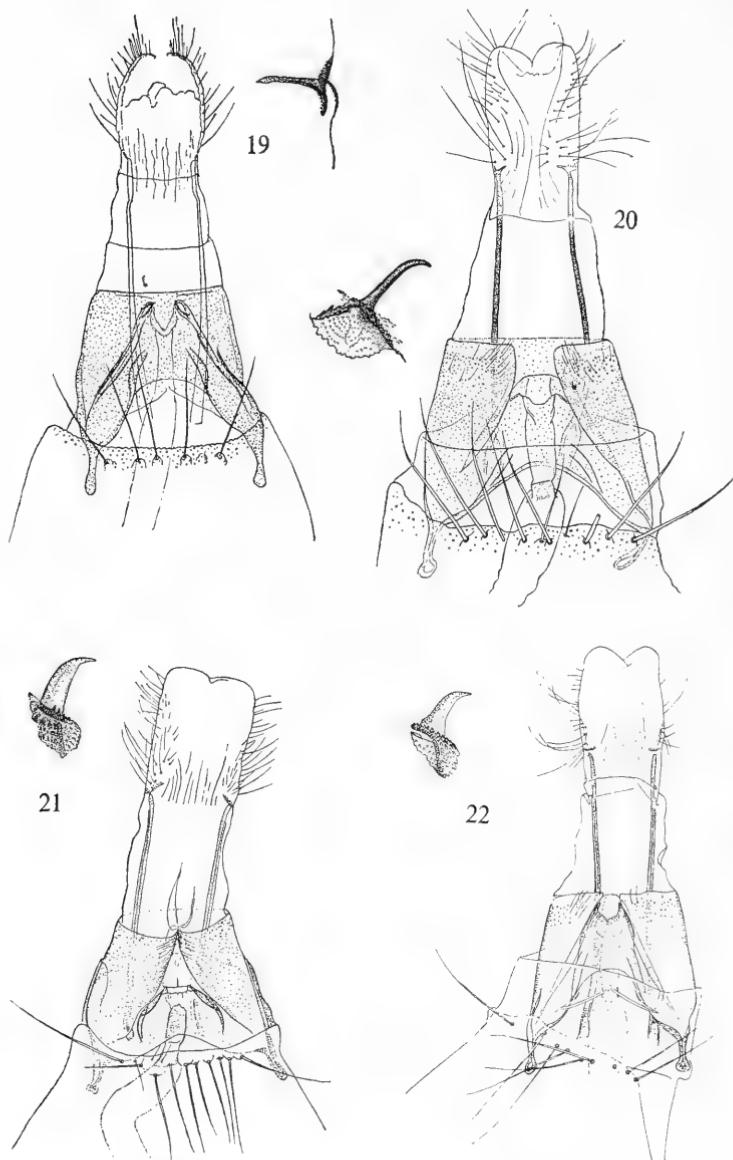


Fig. 19—22. Female genitalia of *Tonica* Walk., holotypes and allotype. 19, *T. melanoglypha* with signum, right; 20, *T. peripsacas* spec. nov., with signum, left; 21, *T. syngnoma* spec. nov., signum, left; 22, *T. centroluta* spec. nov., signum, left

West Java (L. J. TOXOPEUS), 1 ♂, holotype, gen. no. 6130. Judging from the genitalia very close to *C. exculta* Meyr. from Assam; there are tangible differences, however, while the hind wing is decidedly much lighter, so that it seems advisable to separate the Javanese species.

Casmara rhodotrichys spec. nov.

Fig. 13

♂ 29 mm. Head purple mixed with light ochreous. Antenna ochreous; ciliations over 1. Palpus purple slightly mixed with light ochreous, median segment exceeding top of scape; terminal segment very slender, smooth, acute; light ochreous with a purple apical half except tip. Thorax purple, tegula with a narrow whitish edge, tufts on metathorax light ochreous. Abdomen brown-fuscous, dorsum with pale bands along posterior edges of segments, mixed with golden spines, anal tuft ferruginous.

Anterior leg dark purplish-brown, tarsus pale ochreous-ringed. Median leg purplish, broadly ringed with light fuscous-ochreous, tibia with an extended pink whorl of scales; posterior coxae dilated with jet-black scales; posterior leg purplish, tibia with a long fringe of light yellowish-ochreous hairs.

Fore wing narrow and long, ovate-sublanceolate, costa curved and prominent along $1/3$, concave in middle, less curved posteriorly; with three transverse ridges of raised scales. Three raised ochreous-pink tufts beyond $1/4$, on costa, above and below fold, respectively, indicating edge of basal patch; this patch blackish with white marks: a line along base of wing, a streak edging upper raised tuft from below and an oblique attenuated streak from base of dorsum to above its $1/4$; second transverse ridge median, inwards-oblique, formed by two raised dark vinaceous tufts, upper transverse, crossing cell, lower smaller, longitudinal, in fold; area between first and second ridges blackish, with a pale ochreous, elongate, subtriangular patch on costa, posteriorly including a black horizontal line, below this emitting a white transverse line before and parallel to ridge of raised tufts; a third raised tuft at $2/3$, from just below costa to beyond lower angle of cell, wedge-shaped, gently inwards-oblique, ferruginous-vinaceous, its base below costa extended on both sides and light pinkish-crimson; space between second and third ridges black, encircled with a white line, edging median ridge but concave and not touching posterior ridge; a blackish streak between veins 8 and 9 indistinctly traversing raised tuft, thence dilated as far as vein 10, including two white submarginal spots between veins; an oblique pale ochreous streak from between the two tufts of median ridge to tornus; terminal part of wing pale fuscous-ochreous, finely dusted with dark fuscous; this colour filling out a broad posterior part of terminal area, but traversed by light tawny veins and cut by a subterminal white meandering line; termen between veins black. Cilia pale fuscous, basal half except in tornus, with broad black interneurial bars.

Hind wing pale fuscous, strewn with dark bronze-fuscous, coarser dusted on dorsum, veins narrowly tawny-brown.

Male genitalia. Uncus sclerotized throughout, apex rounded in lateral aspect. Gnathos slender, not swollen. Valva with harpe long-bristled; sacculus sclerotized with a dilated semioval base, top rounded, strong, semioval. Cucullus rather slender, lower edge gradually rounded. Aedeagus divided as far as its middle with a short, toothed upper and a long gradually narrowed and curved lower lip.

East Borneo, Balikpapan, 50 m, Mentawi River, 8.X.1950 (A. M. R. WEGNER), 1 ♂, holotype, gen. no. 6166. An elegant species, nearest to *C. agro-*

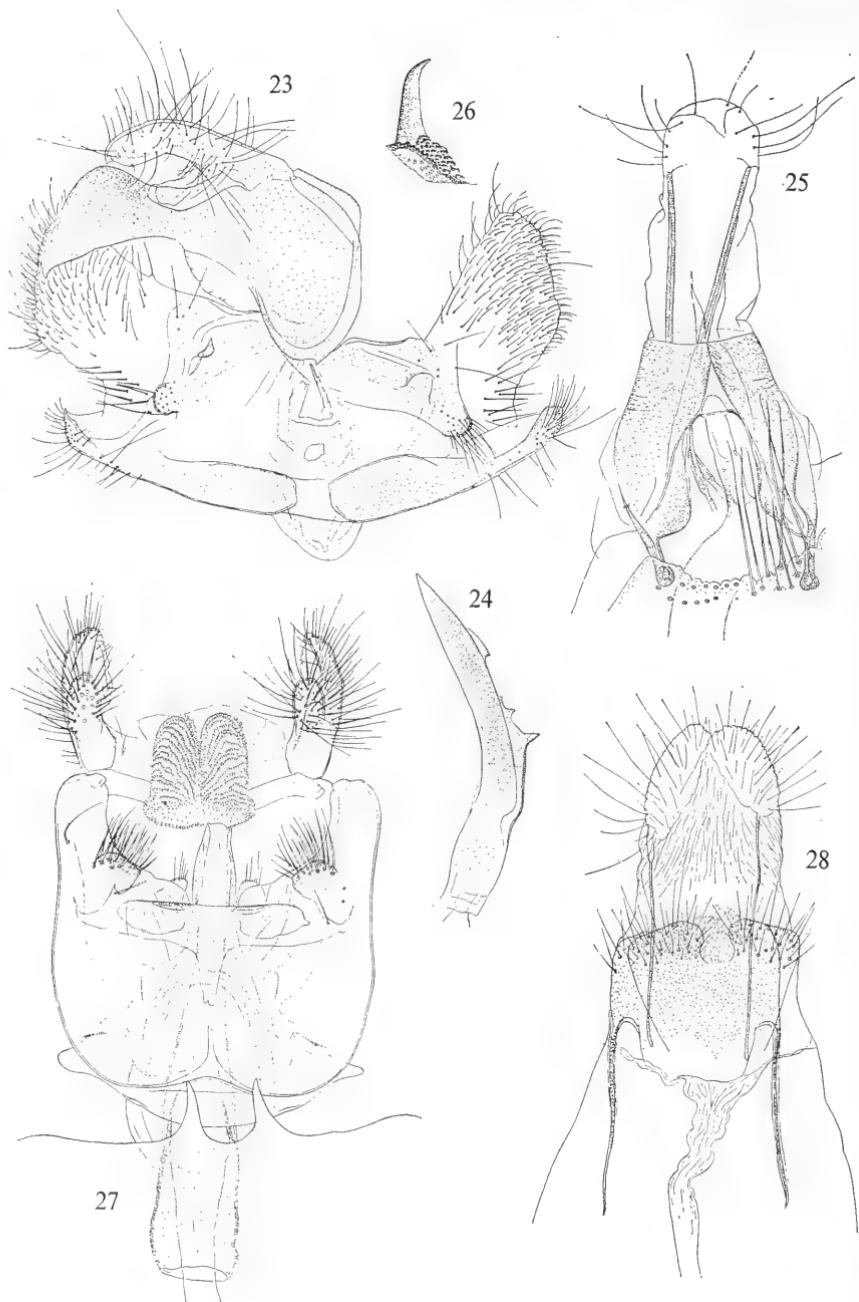


Fig. 23—28. Genitalia of Oecophoridae. 23, *Casmara phobographa* spec. nov., ♂, holotype; 24, the same, aedeagus; 25, *Tonica nigricostella* (Snellen), ♀, gen. no. 4719; 26, the same, signum; 27, *T. melanoglypha* spec. nov., ♂, holotype; 28, *Casmara phobographa* spec. nov., ♀, allotype

noma Meyr. (China), but smaller, brighter marked and with distinct genitalia; the aedeagus resembles more that of *C. patrona* Meyr., also from China, but other parts of the genitalia are quite distinct.

Casmara kalshoveni spec. nov.

Fig. 12, 14—16

♂ 34—44 mm. Head pale ochreous, a flat tuft of long hairs concealing forehead and face and partly covering the eyes; sides of face above and vertex strewn with fuscous-purple. Antenna pale ochreous, scape densely strewn with purple-fuscous, suffused above. Palpus long, recurved, top of median segment exceeding base of antenna, gradually dilated posteriorly with loose scales below, basal segment with a small tuft, terminal segment slender, slightly curved, subobtuse, about $1/3$; pale ochreous densely strewn with fuscous-purple, median segment less densely strewn below apex of upper edge, terminal segment whitish, little strewn, a broad purple ring just below tip. Thorax pale ochreous, coarsely strewn with dark fuscous-purple. Abdomen pale ochreous, dorsum dark fuscous-purple, except pale bands along posterior edges of segments, venter strewn with dark. Legs pale ochreous, variably strewn with fuscous-purple. Anterior tibia strongly dilated with long closely appressed scales; tarsus with short whorls of scales. Median tibia moderately dilated at apex by closely appressed scales, forming a mantle around apical spurs and almost concealing them; posterior tibia with loose long hair-scales above and beneath.

Fore wing elongate, narrow, suboval-lanceolate, apex and termen rounded, termen very oblique. Whitish-ochreous, finely transversely strewn with brown-purple, this colour forming narrow edges to tips of scales, many of which are strongly dilated and enlarged. A large, blackish-fuscous erected-oval ocellus on closing vein, edged with pale ochreous, edge extending to dorsum; this ocellus gently inwards-oblique and dilated above; a large, rather well-defined darker brown-purple V-shaped patch, anterior leg wide, with a blackish round dot against its posterior edge, in cell; posterior leg including ocellus, truncate base of mark extending along median third of dorsum; this patch edged with whitish-ochreous except along costa; blackish longitudinal spot on middle of fold; a white flat tuft below and beyond it; costa strewn with brown-purple throughout; a wedge-shaped spot below its middle (between legs of V-mark) and a similar spot between ocellus and dorsum, conspicuously pale ochreous; slender brighter light ochreous posteriorly dilated small streaks along ends of veins; a regular series of whitish submarginal rounded spots between veins. Cilia pale ochreous, posterior half suffused with purple except in tornus; a deep purple basal streak from costa to end of vein 4, thence broken up in a series of moderate submarginal strigulae reaching dorsum.

Hind wing pale golden-ochreous, irregularly suffused with fuscous-purple: more densely suffused in tornus as far as vein 1c, apex and a faint suffusion above end of cell; a pale golden-ochreous large patch between cell and apex; a suffused round fuscous dot on upper angle of cell. Cilia pale yellowish-golden, a somewhat irregular subbasal purple line.

♀ 37—55 mm. Similar to male. Head only with sides of face and vertex dark;

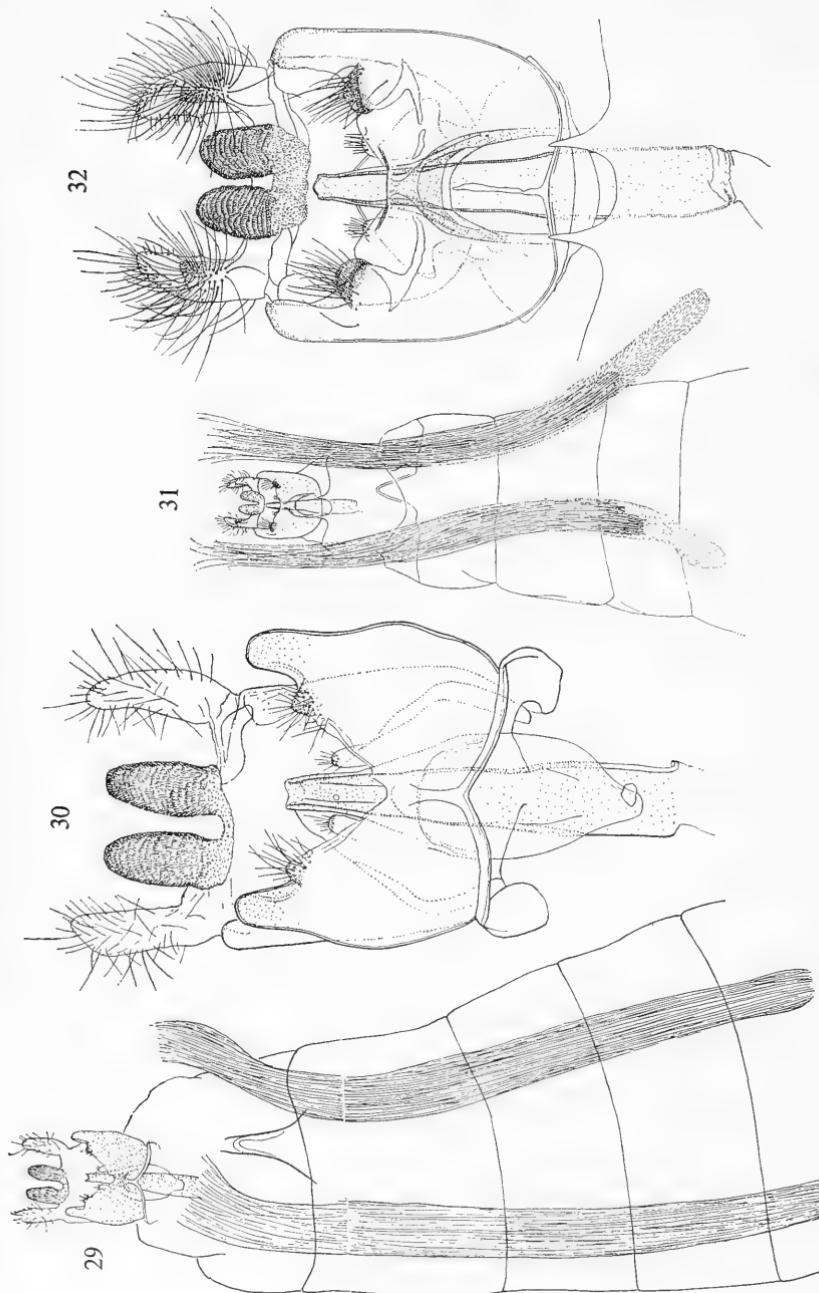


Fig. 29—32. Male genitalia of *Tonica*. 29, *T. nigricotella* (Snell.), abdomen with coremata; 30, the same, genitalia, more enlarged; 31, *T. pharmatis* spec. nov., abdomen with coremata; 32, the same, genitalia, more enlarged

scape dark on basal half. Fore wing rather evenly strown with brown-purple, traversed by two curved outwards-convex pale ochreous faint fasciae from below costa: beyond base and at about $1/5$, representing basal patch; a zigzag pale mark below costa on upper half, preceded on dorsum by an inwards-oblique pale transverse streak; two dark discal spots strongly suffused and ill-defined; ocellus black, slightly more oblique, pale-edged, edge continued by a pale streak almost to dorsum before tornus; a coarse dusting by whitish-ochreous scales in disc before the series of interneural pale spots; other markings as in male, more conspicuous.

Hind wing denser suffused with bronze-purplish, except a pale golden area before apex, smaller than in male; otherwise as in male.

Male genitalia. Gnathos with upper side strongly impressed, concave, frontal profile concave, points narrow. Sacculus sclerotized throughout, free, apex semioval, longer than in *C. regalis*, cucullus narrowed, a slight lateral fold or edge above middle. Aedeagus with rather strong teeth beyond middle above and on strong median projection below.

Female genitalia. Eighth sternite with posterior edge straight, not emarginate. Ostium, a broad, oblique cup, strongly sclerotized below. Colliculum, an irregular short funnel.

Central Java, Gedangan near Semarang, teak forest, 40 m, bred from trunk of *Muraya paniculata* Jack (Rutaceae), 1 ♂, holotype, 31.I.1933, gen. no. 4859; 1 ♀, allotype, 9.I.1933, gen. no. 4860. Further from Gedangan, Telawa and Seneng, teak forest area, some bred as above, III, VIII and IX.1932 and I-II, 1933, 3 ♂, 7 ♀, paratypes (L. G. E. KALSHOVEN).

Judging from the genitalia, closely allied with *C. exculta* Meyr., from Assam, differing by more prominent gnathos, oval cucullus and oval tip of sacculus; however, superficially that species is entirely different.

Dedicated to my friend and colleague, the collector, Dr. L. G. E. KALSHOVEN.

Tonica Walker, 1864

Tonica Walker, 1864, List Lep. Het. Brit. Mus. 29 : 788 (Type-species, *Tonica terasella* Walker, India, ? Borneo). — Meyrick, 1922, Genera Ins. 180 : 167. — Fletcher, 1929, Mem. Agr. Ind., Ent. 11 : 226. — Gaede in Bryk, 1939, Lepid. Catal. 92 : 266.

Binsiita Walker, 1864, List Lep. Het. Brit. Mus. 29 : 832 (Type-species, *B. niviferana* Walker, India, Ceylon, Tonkin, China). — Meyrick, 1902, Trans. Roy. Soc. S. Austral. 26 : 163.

Teratomorpha Turner, 1896, Trans. Roy. Soc. S. Austral. 20 : 20 (Type-species, *Cryptolechia effractella* Snellen, Queensland).

Cononia Snellen, 1901, Tijdschr. Entom. 44 : 80 (Type-species, *Cryptolechia effractella* Snellen, Queensland). — Fletcher, 1929, Mem. Agr. Ind., Ent. 11 : 54 (designation of type-species), 226. — Gaede in Bryk, 1939, Lepid. Catal. 92 : 266.

A remarkable group of large insects of uniform facies but diverse size, markings and colouring. The male genitalia show a high degree of specialisation.

Male genitalia very small as compared to the size of the abdomen, complicated, parts rigidly joined together and not easily read. Valvae and vinculum united into a short cylindre, spherical at base, edge of the base of sacculus with two hairy processes, exterior largest. Cucullus free, hairy. Uncus absent. Gnathos represented

by two densely spinose conical processes. Aedeagus long, straight. Coremata represented by a pair of extremely long retractile pencils projecting between the sixth and the seventh segments, extending almost to the base of the abdomen.

Female genitalia. Ovipositor long, top weak. Eighth segment sclerotized, truncate-conical, ventrally with a broad, triangular split; in this fits the sterigma which is usually weakly developed but shows clear-cut specific differences. The edge of the sternite with strong bristles. Ductus bursae very long, simple, tightly spiraled. Corpus bursae elongate. Signum, a scobinate plate with strong edge and diverse long hooks.

Tonica effractella (Snellen, 1879)

Fig. 17

Cryptolechia effractella Snellen, 1879, Tijdschr. Entom. 22 : 11, t. 7 figs. 17—25.

Teratomorpha effractella : Turner, 1896, Trans. Roy. Soc. S. Austral. 20 : 20.

Cononia effractella : Snellen, 1901, Tijdschr. Entom. 44 : 80.

Binsitta effractella : Meyrick, 1902, Trans. R. Soc. S. Austral. 26 : 164. — Turner, 1917, ibid. 41 : 119.

Tonica effractella : Meyrick, 1922, Genera Ins. 180 : 168, no. 3 — Gaede in Bryk, 1939, Lepid. Catal. 92 : 266. — Common & Arndt, 1959, Empire Cotton Wool Rev. 36 : 28-31, fig. 1—5.

Lectotype, female, hereby selected, 27 mm, "N. and Ind. Natuurk. Vereeniging, Nieuw Holland", label written in SNELLEN's hand; gen. no. 6126. Another female, syntype (paratype), 29 mm, "N.I. Nat. Ver., N. Holl.", original round white label, written in ink.

Female genitalia. Sterigma transverse-semioval with small crescentic sclerites at the sides of lower edge; ostium, a short tube, colliculum a moderate dark ring. Signum very strong, a concave plate with a number of strong teeth decreasing in size in one direction.

Tonica syngnoma spec. nov.

Fig. 21, T. 1 Fig. 1

Tonica nigricostella ♂ Meyrick, 1936 (nec Snellen, 1902), Exot. Microl. 5 : 51.

The unique specimen may be redescribed as follows.

♀ 32 mm. Head and thorax white, irrorated with fuscous-grey. Palpi missing (in original description stated as being "whitish and grey, second joint suffused black"). Abdomen light ochreous, venter infuscated, preanal segment black entirely, anal tuft orange-ochreous.

Fore wing elongate-subtruncate, moderately broad, costa curved at base, broadly rounded-prominent along first third from beyond base, concave in middle, rounded and prominent again at $3/4$, tolerably straight towards apex, apex rounded, termen slightly rounded, little oblique. Whitish, dusted rather irregularly with grey-fuscous, markings chestnut-brown and black. A well-defined, semioval blackish-brown spot on basal $1/6$ of costa, below bearing a suffused black longitudinal streak, projecting posterad; a small black dot on base of dorsum; posterior $2/3$ of costa with a chestnut-brown broad streak, narrowed anteriorly and connected along costal edge by black dusting with basal patch; lower edge of this streak roughly serrate and

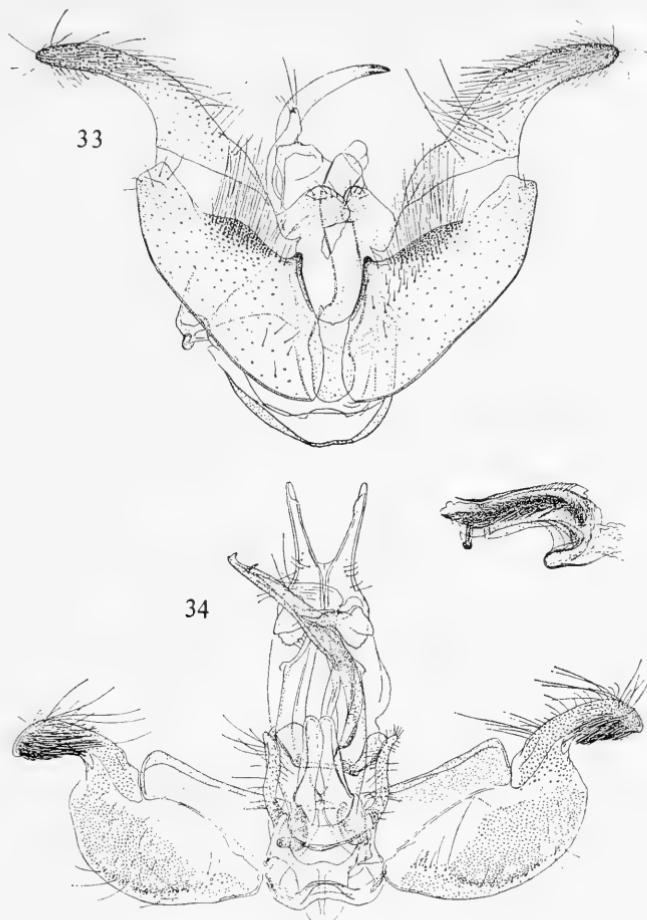


Fig. 33. *Imma mormopa* Meyrick, ♂, genitalia (no. 4791). Fig. 34, *Ethmia submersa* spec. nov., ♂, holotype

well-defined, veins indistinctly streaked with tawny-ochreous (perhaps simply rubbed!), posterior lower part of streak (below vein 7) dark fuscous-brown; first stigma represented by a black prostate γ -shaped mark, with stalk directed posterad, preceded and followed by pairs of rather irregular small marks; second discal stigma well-defined, black, transverse, semioval, immediately followed by a slender raised white crest, an ill-defined greyish suffusion from beyond second stigma to dorsum; ill-defined transverse linear black marks, one in tornus, another before termen, connected with costal streak. Cilia purplish-brown (imperfect) with a pale ochreous base and a black submedian band.

Hind wing glossy pale ochreous, densely dusted with dark fuscous, except towards dorsum and less densely, along costa; extreme apex slightly dusted with black. Cilia ochreous-fuscous, becoming darker fuscous towards apex, in apex dark brown.

Female genitalia. Ventral split of the 8th sternite closed above. Sterigma, a semi-circular narrow band, weak in middle. Ostium short; colliculum moderate, tubular,

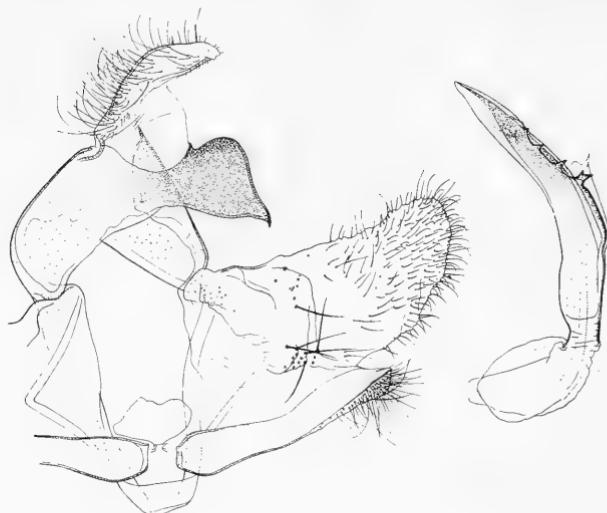


Fig. 35. *Casmara rufipes* spec. nov., holotype, ♂, genitalia

narrower along lower part. Signum small, with a single large hook and a few small spines at its base.

Malaya, Pahang, Tras, 1912 (POPP), 1 ♀, from Meyrick Collection (BM), named "*Tonica nigricostella* Snell." by MEYRICK; gen. no. 4718. This unexpected identification with a completely different species apparently is due to a curious error: MEYRICK thought that *T. nigricostella* Snell. had been described after a male, while SNELLEN's type specimen actually is a female. So there is no question of SNELLEN's *nigricostella* and the present female specimen being conspecific.

***Tonica nigricostella* (Snellen, 1902)**
Fig. 25—26, 29—30

Cryptolechia? (*Cononia*) *nigricostella* Snellen, 1902, Tijdschr. Entom., 44 : 80, t. 6 fig. 3 (Sumatra, ♀).

Tonica nigricostella : Meyrick, 1922, Genera Ins. 180 : 168. — 1936, Exot. Microlep. 5 : 51. — Gaede in Bryk, 1939, Lepid. Catal. 92 : 267.

♂ 45 mm, neallotype: exactly similar to the female, with the same small extent of variation, viz. the extent of dark brown suffusion of the costal edge in the fore wing and that of the faint grey dusting of the disc and the cilia of the hind wing. The only superficial difference is the anal tuft, pale ochreous in male, blackish in female.

Male genitalia. Gnathos halves longer than middle of cuculli. Free top of sacculus moderate; external hairy prominence rather depressed, internal prominence long, finger-like, edge of sacculus oblique, making ventral excision of edge of genitalia triangular.

Female genitalia. Ventral split of 8th sternite closed above. Sterigma, a weak membrane, including a simple subtriangular ostium. Colliculum, a partly closed moderate tube. Signum scobinate, with a single large hook.

"West Sumatra, Lebong Tandai, 26—31.VIII.1921 (C. J. BROOKS), no. 1227", 1 ♀, gen. no. 4719. — Malaya, Perak (J. L. C. BANKS), 1 ♀ (with doubtful abdomen) (BM).

East Java, Trebes, 3000 ft, V.1932 (J. P. A. KALIS), 1 ♀. — West Celebes, Kulawi, Paloe, 3100 ft, III.1937, 1 ♂, neallotype, gen. no. 4789; 1 ♂, 1 ♀; Sidaonta, Paloe, 4500 ft, VI.1937, 2 ♀; Paloe, Mt. Rangkoenaoe, 1800 ft, XII.1936, 1 ♂ (J. P. A. KALIS) (BM, Rothschild Bequest).

The holotype of this species, a female, "Sumatra", unfortunately is missing.

Tonica pharmacis spec. nov.

Fig. 31—32

♂ 25 mm. Head light ochreous, vertex with three faint frontally converging fuscous lines. Antenna light ochreous, finely ringed with brown, scape brownish. Palpus with median segment very long, along upper half hardly strewn with brownish, tuft long, roughly projecting forward; terminal segment with two small tufts projecting forwards and backwards; this segment pale ochreous externally, with two large dark brown spots internally. Thorax light ochreous, apex and an antemedian band suffusedly brownish; four highly raised tufts arranged in a quadrangle; tegula pale ochreous, internal edge infuscated. Abdomen pale orange-ochreous with a strong golden gloss. Legs pale ochreous.

Fore wing elongate-subtruncate, moderately broad, little narrowed posteriorly, costa strongly sinuate, prominent and roughly ciliate at $1/4$, concave and smooth in middle, less prominent and slightly rounded along posterior third, two large triangular raised scale-tufts, at the beginning, and in the middle of this part, apex moderately pointed, termen slightly sinuate above, rounded beneath, little oblique. Light ochreous, across middle third becoming brighter, ochreous-tawny, markings formed by brown suffusion. A broad, rather well-defined streak along costa, from well beyond base to apex, extending below as far as upper edge of cell and the course of vein 7; on middle of costa this streak containing a narrow marginal mark of ground colour; an irregular-semioval large patch extending over median $2/3$ of dorsum, touching costal streak with its top; anterior edge of patch rather well-defined, very oblique and concave, posterior edge rather suffused, ill-defined, emitting from its lower part a wedge-shaped paler brown suffusion to $3/4$ of lower edge of costal streak; pale terminal area traversed by brown lines along veins; central third of disc with some four tufts, three upper rounded, in a curved horizontal series, ultimate one on closing vein; fourth tuft larger, elongate, horizontal, in middle of fold; terminal area with two inwards-oblique, straight series of less raised tufts between veins, first series at $2/3$ between cell and termen, second submarginal. Cilia brown along costa, pale ochreous elsewhere.

Hind wing glossy pale ochreous, cell between 1a and 1c towards wing edge dusted with fuscous; apex slightly dusted with dark brown. Cilia pale ochreous, along posterior third of costa and around apex mixed with dark brownish-grey.

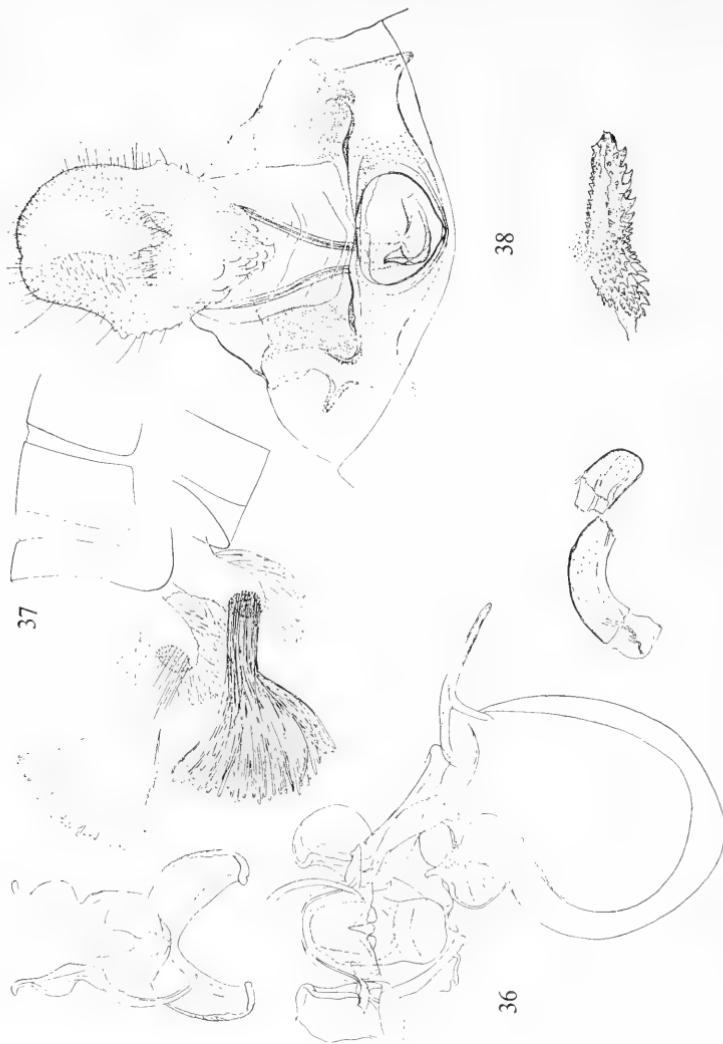


Fig. 36—38. *Chrysethmia hypomelas* gen. et spec. nov., genitalia. 36, ♂, holotype, with aedeagus, right; 37, the same, end of abdomen with coremata; 38, the same, ♀, allotype, below, signum

Male genitalia. Gnathos halves thick, not exceeding half the length of cucullus; the latter with a ventral lobe. Sacculus with a rather long free top; external hairy prominence large, internal depressed.

North east Sumatra, Deli, bred from larva on *Derris*, V.1935 (Deli Proefstation), 1 ♂, holotype, gen. no. 4717. Unique. Allied to the preceding species, but quite differently colored and marked.

Derris plant produces a well-known insecticide; thence the name for the species.

Tonica centroluta spec. nov.

Fig. 22

♀ 26 mm. Head glossy creamy-white, vertex suffused with dark fuscous in middle. Antenna whitish-ochreous, dark fuscous above. Palpus with median segment with rather appressed scales and a long not expanding tuft in front, projecting forward; terminal segment slender, longer than median, slightly dilated and roughish anteriorly at the first dark band; creamy-white, median segment with a short lateral streak from base; a suffused fuscous streak along posterior half of its lower edge, and a very coarse irroration along upper half, blackish-fuscous; frontal tuft infuscated along lower edge; terminal segment with two blackish-fuscous rings. Thorax creamy dusted with dark fuscous (rubbed). Abdomen glossy dark fuscous. Legs whitish-ochreous.

Fore wing moderately broad, elongate-subtruncate, moderately narrowed posteriorly, costa strongly sinuate, rounded-prominent along anterior half, concave in middle, almost straight posteriorly, apex rounded-rectangular, termen straight above, rounded beneath, little oblique. Whitish-ochreous, markings light tawny and dark purplish-brown. A light fulvous-tawny suffusion along posterior $3/5$ of costa, continued by a narrow gradually attenuated subcostal streak to anterior extremity of costal prominence; posteriorly this suffusion is narrowly interrupted by strigulae of ground colour running along veins, each edged by an irregular dark brown line; a dark purplish-brown transverse patch across its anterior edge well-defined and concave anteriorly, very oblique, to about $1/6$ of dorsum; its posterior edge strongly suffused, at about middle of distance between cell and termen, leaving a terminal blotch of ground colour, pale at edge of wing, anterad gradually becoming suffused with light fuscous-purplish, a dark purple-brown line along posterior part of fold, not reaching tornus; some sparse speckling of pale tawny and brown scales over pale basal area; this area has an oval shape and contains a small obliquely transverse brownish raised crest at about $1/3$ of wing length in middle of disc; a higher dark brown tuft on lower angle of cell, another smaller one above and slightly before it and a still higher horizontal short crest just above fold and beyond transverse crest; apex pale, narrowly margined with brown. Cilia (imperfect) pale ochreous, along upper part of termen and in apex apparently mixed with dark brown.

Hind wing rather dark purplish-grey, apex and dorsum suffusedly pale ochreous, space between veins 1a—1c towards edge of wing suffused with dark brown. Cilia rather pale fuscous.

Female genitalia. Ventral split of the 8th sternite open. Sterigma triangular, lower edge concave. Lamella antevaginalis with four converging ridges, a small strong cup-shaped ostium at their top. Colliculum tubular, long, lower part, a short dark cylindre. Signum strongly scobinate, hook simple, broader and shorter than in *T. pharmacis* spec. nov.

Southeast Borneo, Ampah, 0—50 m, IV-V.1948 (LIEM SWIE LIONG), 1 ♀, holotype, gen. no. 4694.

Tonica peripsacas spec. nov.

Fig. 20

♀ 31 mm. Head pale ochreous, vertex slightly mixed with brownish. Palpus with median segment whitish-ochreous, strewn along median third with a longitudinal group of a few fine fuscous scales, continued as a horizontal streak of pale fuscous-grey suffusion just below upper edge of frontal tuft, lower edge and base of median segment, and basal segment entirely, fuscous; apical segment black inwardly and in front, except at base, and at two tufts ($1/3$ and $2/3$). Thorax pale ochreous (greasy). Abdomen dark bronze-fuscous, becoming pale ochreous towards base.

Fore wing broad, suboval, costa strongly rounded-prominent at $1/3$, serrate-prominent before angle, termen rounded and oblique. Whitish-ochreous, slightly suffused with fuscous-grey, tending to form longitudinal streaks. Markings dark fuscous, slightly suffused; slightly rubbed, but the following raised tufts present: a small one on base of upper edge of cell, another on its middle; a strongly raised tuft on closing vein and a similar, large one, before middle of lower edge of cell, the last one with a fuscous-grey base. A slightly excurved transverse series of markings (probably edge of basal patch) before $1/5$: a subquadrate spot on costa continued posteriorly by a narrow line along extreme edge of costa; a suffused horizontal line from base along upper edge of cell and a second parallel line from beyond base just below preceding; and a short horizontal strigula well below fold; these markings indistinctly continued posteriorly by streaks of faint greyish suffusion which tend to converge in a faint cuspidate greyish spot in centre of disc, marked with a small horizontal strigula and a black point above and parallel to middle of fold; posterior fourth of costa with four elongate marginal spots, more or less interconnected by fuscous suffusion; a series of fine moderate lines of dark fuscous dusting along veins, from vein 11 at costa to vein 1c on dorsum, lines between these in a broadly curved subapical series. Cilia whitish with three minute spots of fuscous dusting above ends of veins 6, 5 and 4.

Hind wing pale ochreous, densely dusted with pale grey, along all veins dusted with darker fuscous, extreme base white, separated by a transverse oblique dark fuscous line. Cilia pale ochreous suffused with pale grey, a pale grey subbasal shadow, opposite apex a median and an apical blackish streaks.

Female genitalia. Sterigma with a rounded top, lamella postvaginalis laterally forming sclerotized elongate-semioval plates; lamella antevaginalis, a moderate rim to ostium, slightly dilated laterally. Colliculum weak, a narrow ring. Signum robust, a scobinate plate with a long and slender thorn (foreshortened in figure).

West Celebes, Koelawi Paloe, 5100 feet, March, 1937 (J. P. A. KALIS), 1 ♀, holotype, gen. no. 6131 (Rothschild Bequest, BM).

Superficially resembling *T. lagaropsis* Meyr. from the Philippines, but differently marked and with distinct genitalia, which resemble those of *T. effractella*, but are more sclerotized.

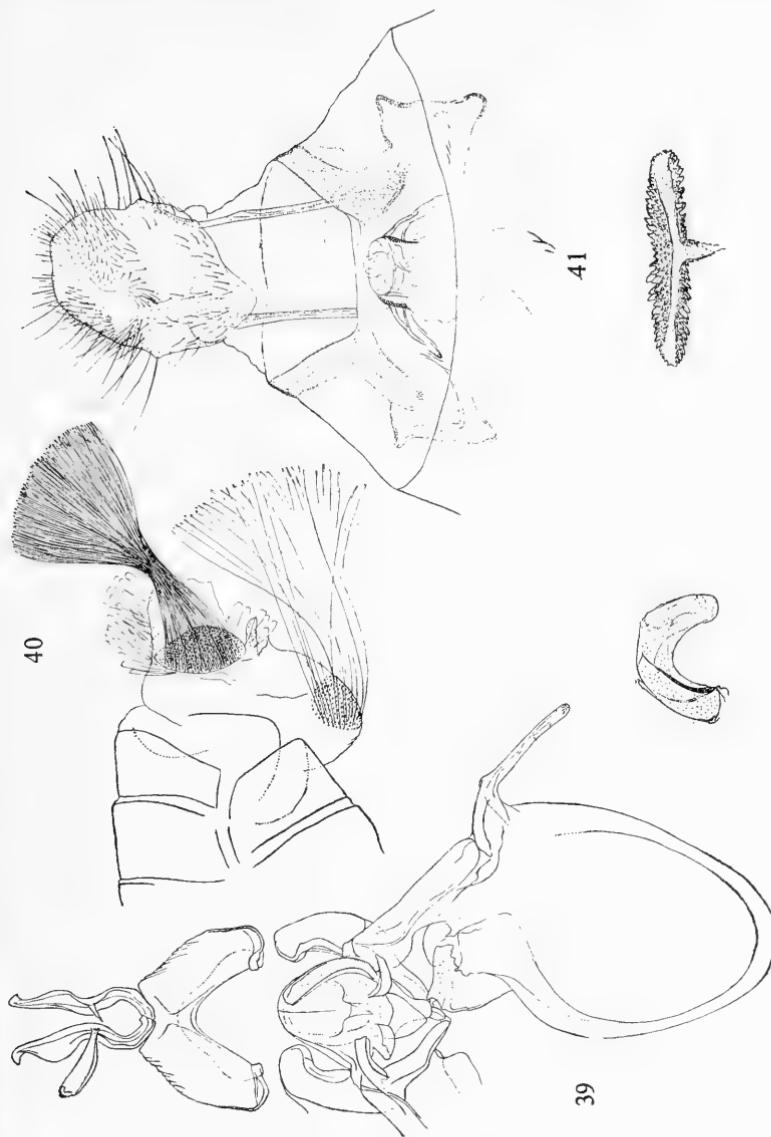


Fig. 39—41. *Chrysethnia neogena* gen. et spec. nov., genitalia. 39, ♂, holotype, with aedeagus, right; 40, the same, end of abdomen with coremata; 41, the same, ♀, allotype, below, signum

Tonica melanoglypha spec. nov.

Fig. 19, 27

♂ 19 mm. Head creamy-white, vertex sparsely dusted with fuscous. Palpus very long, median segment creamy-white, strongly brushy along edges, especially in front; terminal segment slender, slightly tufted in front and back at $1/3$ and $2/3$, outwardly creamy with two narrow black bands, inwardly lower third black, a broad band at $1/3$, in front upper third with a black streak. Thorax rather dark

fuscous-grey, collar and tegula creamy, dusted with fuscous. Legs creamy, tarsi infuscated towards tips. Abdomen creamy.

Fore wing oblong, narrow, costa strongly curved along basal third, concave in middle, little curved posteriorly, with a rough triangular tuft projecting forward at $\frac{1}{3}$ and a series of three small tufts at $\frac{3}{4}$, apex rounded, termen rounded, oblique. Creamy, partially finely dusted with pale greyish-fuscous, not dusted towards costa anteriorly and between veins elsewhere; dorsal area below fold evenly suffused with pale greyish-fuscous. Markings sparse, blackish-brown. A triangular well-defined spot on costa just before first costal tuft; an ill-defined elongate horizontal suffusion below and slightly beyond this spot and a narrow strigula below this, below fold; two very small longitudinal marks in cell at $\frac{2}{5}$; apical half of costal edge with a narrow line becoming broader posteriorly, forming a distinct blotch in apex, linear again along upper fourth of termen; this streak interrupted by three costal tufts of ground colour, each with an oblique black short strigula below costa; large raised scale-tufts of pale ground colour; a vertical pair at $\frac{1}{3}$ of disc, a horizontal pair above centre of disc and a transverse, slightly inwards-oblique complete series before termen. Cilia creamy-white, around apex with an apical and a subbasal blackish band.

Hind wing creamy-white, apex slightly bent down, narrowly edged with a short black strigula. Cilia concolorous, along posterior half of costa and around apex suffused with leaden-grey with pale base and a blackish subbasal line around apex.

♀ 22 mm. Head and palpus more dusted with fuscous. Fore wing more dusted with fuscous, dark markings extended, a larger suffusion in centre of disc, all veins streaked with dark fuscous; black subcostal strigulae towards apex longer. Hind wing pale greyish-fuscous, veins a trifle darker, apex dusted with fuscous. Cilia grey-fuscous. Otherwise as male.

Male genitalia. Gnathos halves moderate, with an extended communal base. Cucullus deeply bilobed. Sacculus top sclerotized, the hairy prominence large but flattened. Lobus analis small, free. Lower edge of sacculi horizontal, long and slender. Edge of 7th ventrite with two approximated cusps. Coremata reaching basad to the 3rd segment.

Female genitalia. Split of the 8th ventrite open. Sterigma deeply excised above, ostium cup being elongate; lateral ridges narrow, submedian thick. Colliculum tubular, weak. Signum small, short-dentate with a single very long spine.

West Java, Batavia, 1893, 1 ♂, holotype, gen. no. 4816; the same, 1894, 1 ♂, paratype; the same, 1888, 1 ♀, allotype, gen. no. 4817; 2 ♀, paratypes. 2 ♂, 3 ♀. Allied to *T. pharmacis* spec. nov.

ETHMIIDAE

Ethmia submersa spec. nov.

Fig. 34

♂ ♀ 27 mm. Head and collar white, concavities of antennae black, collar with a large black median spot and a narrow black anterior edge. Palpus greyish-white, median segment with a black basal half and a subapical black ring, open frontally;

terminal segment black with a median ring and extreme tip white. Thorax slaty-grey, with a moderate gloss, whitish-grey in certain lights; a black dot on shoulder, a larger dot at the base of inner edge; a pair of submedian, another of subapical black dots. Abdomen in ♂ bright-orange-yellow, tergite 1 with a large transverse black spot, tergites 5—7 only with black transverse bands along posterior margins, venter with pairs of large spots on segments 2—4 and 6. Abdomen in ♀ similar, but segment 7 with a black ring open ventrally.

Fore wing rather broad, oblong-oval, costa considerably curved, apex and termen rounded. Dark slaty-grey, with well-defined whitish-grey narrow edges to markings and large spots; base of extreme costal edge black; a whitish streak along base of costa limited by the course of vein 12, and containing two black dots; another such streak subcostal, from below middle of preceding to $2/3$ of wing; a less well-defined whitish patch filling out less than posterior fifth of wing with apex and termen; round black dots, except the two costal, arranged thus: one just above fold beyond base; three more, in line with this, at $1/4$, $1/2$ and before $3/4$, respectively; first to third of these alternating with two smaller dots above dorsum; a curved subcostal series, first of these largest, rounded, below upper edge of cell before middle of wing; four smaller below costa and before apex, two ultimate of these connected; two larger, somewhat irregular dots in an oblique series before and above tornus; a marginal series of about ten dots partly interconnected and rather ill-defined, large and irregular. Cilia dark grey.

Hind wing bright orange. Apical black spot large, with an acute subcostal tooth reaching basad to before end of cell, edge below this regularly and deeply curved and reaching end of vein 1c. Cilia orange, around black spot dark grey. On the under side of hind wing apical spot well-defined, connected by a broad grey streak along costa with base.

Female exactly similar, but spot on collar larger, dots on tegulae small, subcostal whitish streak fainter.

Male genitalia. Uncus with a dilated and rounded base, furcate, prongs straight, long. Gnathos with a strong transverse plate, with a rather broad, rounded-truncate lobe on each side; median part of gnathos long and slender, sclerotized, ending in a couple of thorns. Anellus with a bilobed rostral and a rather long and rounded caudal process. Anellus lobes as long as in *E. paeclaris* but sinuate. Vinculum sinuate. Valva with sacculus gradually rounded. Aedeagus of the usual shape.

Female genitalia. Sterigma trapezoidal, with the upper edge concave. On each side a large triangular aciculate fold with a rounded top; mesially each fold forms a smaller smooth subcardiform fold. Colliculum, a short funnel, dentate inwardly, upper edge sclerotized but interrupted at one side. Signum rather small, rhomboidal.

West Celebes, Paloe, Mt. Tompoe, 2700 feet, II.1937 (J. P. A. KALIS), 1 ♂, holotype, gen. no. 5547, 1 ♀, allotype, gen. no. 5548 (BM).

Closely allied with *E. pullata* Meyr. from the Solomon Islands, but differing by the genitalia.

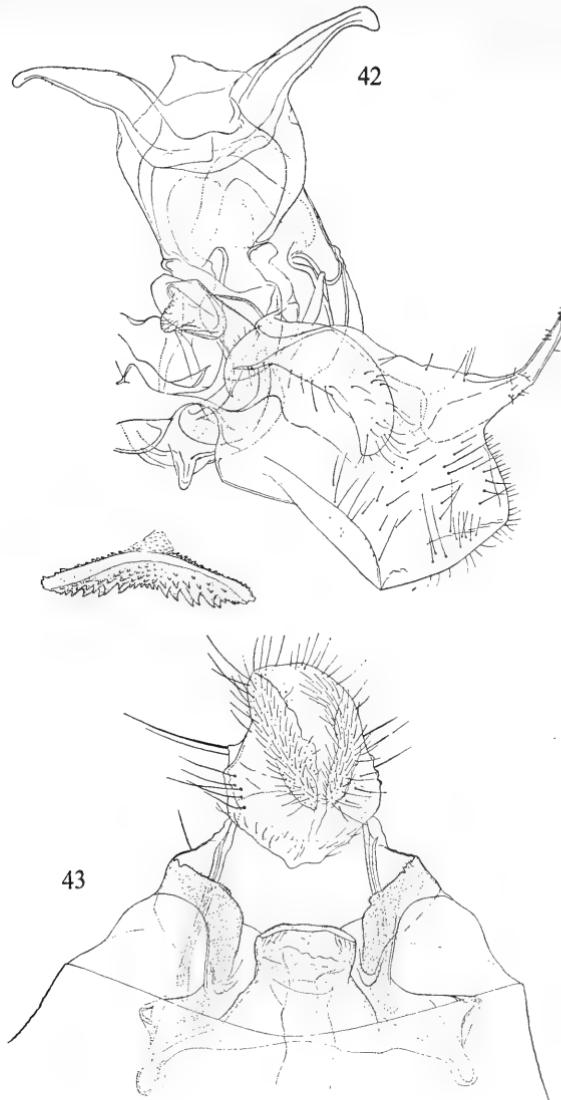


Fig. 42—43. *Agrioceros subnota* spec. nov., genitalia. 42, ♂, holotype; 43, ♀, allotype, above, signum

***Agrioceros subnota* spec. nov.**

Fig. 42—43

♂ ♀ 27—28 mm. Head and palpus pale ochreous, basal half of median segment of palpus black above; face suffused with blackish, vertex with two black spots. Antenna light ochreous, scape with a black subapical posterior spot. Thorax bright orange-yellow, collar with a median black spot, a pair of lateral subapical spots, a

black spot on inner edge of tegula at its base. Abdomen deep orange-yellow, valvae black, a pair of sublateral and one submedian black dots.

Fore wing oblong, oval-subtruncate, costa gently curved, apex and termen rounded, little oblique. Deep orange-yellow. Markings dull black. A streak along base of costa. Basal dots unequal, lower largest; discal spot large, median pair largest; posterior spot well-defined, central shifted towards costa; pretornal spot large, round; a large black dot in apex, a streak along upper half of termen and a minute line halfway between these markings in male, connected with the terminal streak in female. Cilia yellow, black with yellow base opposite marginal markings.

Hind wing in male with an androconial subcostal field of flatly depressed scales reaching to middle; pale golden-yellow, becoming deeper yellow towards apex, in female middle of wing suffused with pale fuscous, neither reaching vein 1c, nor termen. Cilia golden-yellow.

Male genitalia. Tegumen large and broad, pedunculi divided, upper pedunculi resting upon long processus basales. Uncus somewhat depressed, bicornute, horns long, diverging almost horizontally. Labis, a large finely haired, but weak sausage-like process. Valva broad, moderately long; sacculus ill-defined, cucullus broadly rounded-truncate, costa with a long and slender apical process. Aedeagus semi-circular.

Female genitalia. Sterigma large, subtrapezoidal, with aciculate lateral bands, projecting lower angles with rounded appendages to them; transverse portion, being lamella antevaginalis and postvaginalis united, forming a broad tube around ostium bursae. Signum, folded, stellate with a short and broad "stalk".

Central Java, Telawa, teak forest, 1.II.1936, feeding on leaves of an unnamed plant (no. 2003) (Dr. L. G. E. KALSHOVEN), 1 ♂, holotype, gen. no. 6133, 1 ♀, allotype, gen. no. 6140; 1 ♂, 2 ♀ paratypes, gen. no. 6132 ♀.

Superficially almost exactly similar to *A. magnificella* Saub. from the Philippines, differing by the absence of the upper anterior spot of the postmedian group of spots, and by the black, not pale fuscous suffusion of the hind wing. The genitalia, especially of the males, however, are widely differing.

Chrysethmia gen. nov.

Fig. 44

Head with smoothly appressed scales, face entirely smooth. Proboscis developed, except top densely and roughly scaled. Ocellus absent. Antenna smoothly scaled, minutely ciliate in the two sexes. Labial palpus long, recurved close to face, smoothly scaled, median segment not dilated, not reaching top of eye, terminal segment about 2, pointed. Maxillary palpus moderate, slender, top roughish and slightly dilated; appressed to proboscis and slightly crossing each other in front. Thorax smooth. Posterior tibia dilated with long dense hairs above and beneath, flattened laterally.

Fore wing oblong-oval, smoothly scaled, under side with a fringe of scales along costa and vein 12 to beyond $2/3$, concealing vein 12. Vein 2 from before angle, 3 from angle, 4, 5 separate, 7 and 8 stalked, 7 to just above apex, 9 straight, 10 from $3/4$ distance 10—9, 11 from middle.

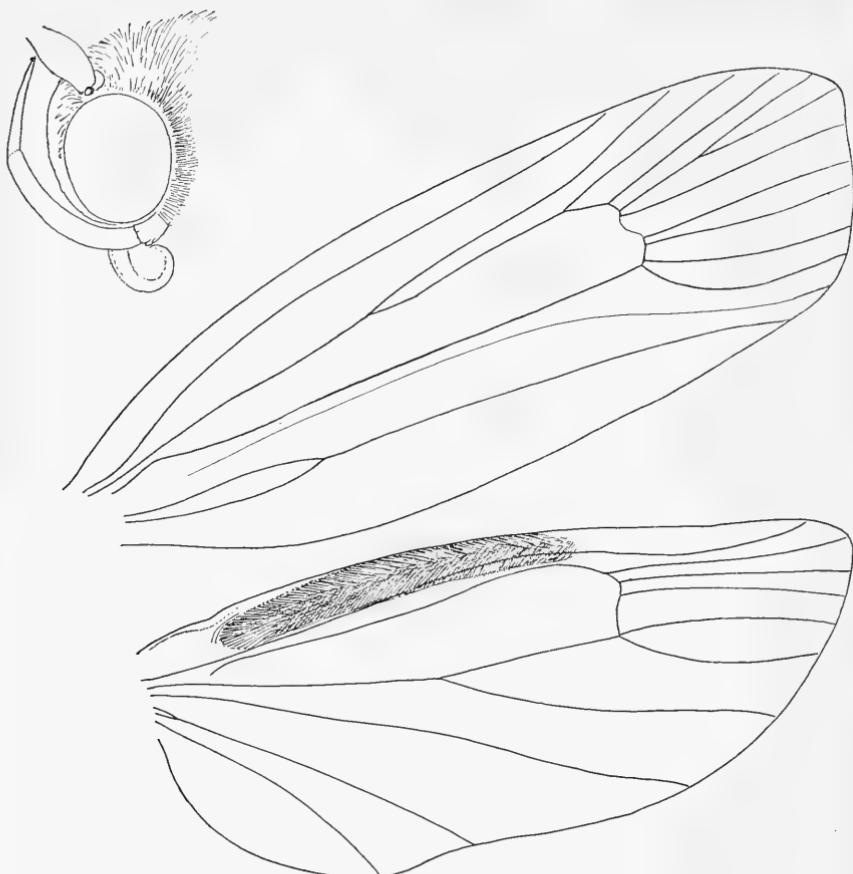


Fig. 44. *Chrysethmia hypomelas* gen. et spec. nov., head and wing neuration, ♂

Hind wing semioval; in male narrowed and more pointed, costa on the upper side with a longitudinal band of androconial modified scales along vein 8, diversely shaped, sometimes very short, sometimes longer and very dense, with additional tufts of pencils of hair-scales from base of wing. Vein 2 from beyond middle, 3 and 4 connate from angle, 5 median, straight, 6, 7 parallel.

Male genitalia. Tegumen semicircular. Uncus broad but short, top bifid. Gnathos entirely paired, tops curved down, simple rods, apparently fastened to transtilla. Valva rounded or oval, rather simple, with a long process at base of costa. Labis, a simple large rising prominence. Aedeagus short. Usually there is a pair of large finger-like extensile appendages of the intersegmental membrane between the 8th and the 9th abdominal sternites, covered with large modified scales and bearing at the top a large pencil-like corema. In one species coremata, surprisingly, absent.

Female genitalia. Ovipositor globular, halves moderately sclerotized. Sterigma, together with the pleurae of the eighth segment forming a large trapeze, with diversely shaped projecting angles and a large central opening or prominence,

being the ostium; colliculum indicated by an irregular sclerite. Ductus bursae spiraled. Signum a transverse moderately broad "lamina dentata".

Type-species, *Chrysethmia hypomelas* spec. nov. (Celebes).

A natural group of tropical species with characteristic compact male genitalia, quite dissimilar from those in *Ethmia* Hubn., to which genus the golden-yellow, black-dotted species have been attributed until present. They are closer allied with *Agrioceros* Meyr., described from the Philippines which is intermediate and forms the connection with *Ethmia*.

Ethmia zelaea Meyrick, 1906, Journ. Bombay Nat. Hist. Soc. 17: 409 (♂, Ceylon), also belongs to the present genus. The genitalia have been illustrated by CLARKE, 1965 (Meyrick's Types 6: 433, t. 214 fig. 3a—b).

KEY TO THE SPECIES

1. Hind wing unicolorous, yellow *zelaea*
 — Hind wing partly suffused with grey or black 2
 2. Hind wing with a grey suffusion extending almost to apex and exceeding vein 1c *hypomelas*
 — Hind wing with a black suffusion (grey in faded specimens) not reaching apex and limited by vein 1c *neogena*

Chrysethmia hypomelas spec. nov.

Fig. 36—38, 44

♂ 26, ♀ 29 mm. Head yellow-whitish, palpus touched with ochreous, face with a vertical median dark fuscous spot, larger in female, vertex with a large dark fuscous spot. Antenna light ochreous, scape yellow-whitish with a black subapical spot on back. Thorax light yellow-orange, a large black spot on median third of collar, two round lateral dots before apex; a small spot on base of tegula below inner edge, partly concealed under collar. Abdomen deep orange-yellow, anal tuft black inside, yellow outside, valvae black; one pair of dorsolateral another, of ventrolateral dots on each segment.

Fore wing oblong, suboval-truncate, costa moderately curved throughout, apex and termen rounded, termen little oblique. Bright glossy orange-yellow, markings, black round spots. A small streak on base of costal edge, a curved series of three equal basal spots: one small spot below costa beyond base, followed by a second, a third below and before first, in fold close to its base; four larger dots arranged in a lozenge in disc before middle, posterior of these largest, in male elongate, lower below fold; five smaller dots in posterior third, shifted towards costa: four in an oblique rectangle, fifth in its centre; anterior pair of these dots largest; in female these dots small; a small pretornal dot on dorsum just below end of cell; four elongate dots along apex and upper part of termen, apical longest, second small, remaining dots often interconnected. Cilia concolorous with wing, with broad black or dark grey bars opposite black marginal spots.

Hind wing in male with a dense brush of very long pale yellow scales along costal $\frac{2}{3}$, directed apicad, covering a patch of short, dark, and bristly hair-scales of the subcostal black brush; wing dark fuscous as far as vein 1c; dorsum light

yellow; extreme edge in apex and along termen suffused with yellow. Cilia yellow.

Male and female genitalia as described with the genus.

West Celebes, Paloe district, Sidaonta, 4500 feet, II.1937, 1 ♂, holotype, gen. no. 5567; Southwest Celebes, Pangean near Maros, 2000 feet, III.1938, 1 ♀, allotype, gen. no. 5568; 1 ♂, 1 ♀, paratypes (BM).

Differs from the following species by deeper yellow fore wing and darker suffused hind wing in the male, while in the female this suffusion is grey and not exceeding vein 1c. The genitalia in the two sexes and the coremata show also clear-cut differences.

Chrysethmia neogena spec. nov.

Fig. 39—41

♂ ♀ 28—29 mm. Very similar to the preceding but differing thus. Palpus, median segment with basal half black above. Head white, face fuscous, mixed with grey and yellowish, suffused with black below. Black spot on vertex tending to fall in two in male, double in female. Thorax deeper orange-yellow, markings as in *hypomelas*. Abdomen deep orange-yellow, valvae black surrounded by a golden anal tuft except beneath, venter with suffused black sublateral and transverse streaks, one pair of dorsolateral dots; abdomen in female with a pair of larger dorsolateral dots and one pair of ventrolateral dots on each segment, without black suffusion.

Fore wing, base of costal edge with a longer black line; basal spots unequal, lower largest, upper small; the four discal spots larger, lower largest; posterior spots very unequal, lower anterior spot and central spot being round and much larger than the irregular posterior pair; pretornal dot large and round.

Hind wing in male with costal brush greyish-yellow, scales denser but shorter than in *hypomelas*; pale yellow, dorsum and apex suffused with deeper golden-yellow; less than posterior half of wing as far as upper edge of cell to before apex, suffused with black, this suffusion with a well-defined convex edge posteriorly, anteriorly becoming light grey and extending towards base; in female this suffusion less extended towards apex, and paler. Cilia yellow.

Male genitalia resembling those in the preceding species, and differing as follows. Upper half of tegumen much smaller than lower. Uncus halves emarginate, not deeply incised near base. Valva oval, longer, less rounded, costal process longer. Corema scales longer and narrower.

Female genitalia. Lateral bands of sterigma acicular, angles more rounded. Ostium more prominent.

Saley er Island, Somarisi, 1660 feet, XII.1938 (A. J. P. KALIS), 1 ♂, holotype, gen. no. 5569, 1 ♀, allotype, gen. no. 5570; 1 ♂, 1 ♀, paratypes (BM).

APPENDIX

THE BIOLOGY OF CASMARA KALSHOVENI DIAKONOFF,
AN OECOPHORID BORER

BY

L. G. E. KALSHOVEN

Blaricum, the Netherlands

The borer infestation was detected by the Javanese personnel of my temporary entomological field laboratory at Gedangan (KALSHOVEN, 1955), at a time when particular attention was being paid to the borers in green stems and trunks in the cultivated teak woods of Central Java. The borer larvae were found in the shoots of the small-leaved, wild form of *Murraya paniculata* Jack. (Rutaceae; vernacular name 'djenar', cf. HEYNE, 1950). This is a small tree or shrub up to 6 m high, not uncommon in the area.

After the attack had been discovered through the occurrence of dying and dead shoots, it was observed from November, 1932 to May, 1933. A total of 84 infested shoots and branches, 1—4.5 cm thick, were collected from some 14 trees.

The shoots were bored from immediately below the top or from a lower part downwards over a length of up to 65 cm, mostly in the ligneous parts. Once in a single 2.5 cm thick branch three parallel tunnels in the core were found. In the trunk of another tree, 4.5 cm in diameter, the tunnel ran immediately under the bark. Small black holes from which sap had flown, were visible along the infested parts. According to the collector no frass was seen attached to the branches, the excreta apparently being ejected in loose particles. As a rule the remaining foliage on the branches was still green or withering.

During a visit to the laboratory at the end of October, 1932, I made the following notes. The larvae live in narrow, black-walled, longitudinal tunnels (T. 1 Fig. 2). They are slender, with yellowish thoracic segments, the abdomen is isabel-coloured, the pronotal shield is of a curious shape, the last abdominal segment being flattened and strongly sclerotized. The initial stage of the attack was not observed. The smallest larva collected was 25 mm long, 3 mm broad, the largest 48 mm \times 5 mm.

The clipped shoots were placed in water. Some larvae were moved to a hole in a freshly cut 'djenar' branch. Moving some other larvae to fresh cassava tubers (*Manihot utilissima*, rich in amylose) — method used with some success in raising young larvae of the Cossid *Xyleutes ceramica* (Walk.) — failed altogether in the present case.

Mature larvae pupated readily indoors in the tunnels. Pupae were encountered in the field from the end of November to mid December. Moths emerged between 20 December and 10 May. Notwithstanding considerable mortality, particularly in the larval stage, 19 moths altogether were bred in the laboratory.

Shoot-boring habits have already been recorded in some Oecophoridae in India. T. B. FLETCHER (1917) described the life-history of *Tonica niviferana* Walk., a borer in the shoots of *Bombax malabaricum* DC. (Bombacaceae) and illustrated

it with a nice coloured plate. The borer is not considered to be a real pest, though its activities have stunted young growth in cultivations. The same species was dealt with by BEESON (1941). Judging from the particulars given, its habits differ strongly from those of the *Murraya* borer. In addition to this, BEESON has listed a second Oecophorid borer, viz. *Allotalanta triocellata* (Staint.), which lives in the shoots of *Anthocephalus chinensis* (Lamk.) Rich. ex Walt. [Rubiaceae, = *A. cadamba* (Roxb.) Miq.]. The larvae of five other Indian species, mentioned by BEESON, have different habits, some feeding on leaves spun together, others being case-bearing defoliators.

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Fig. 1. *Tonica syngnoma* spec. nov., ♀, holotype, Pahang (BM) (Phot. LM)



Fig. 2. *Murraya paniculata*, branch tops tunelled by larvae of *Casmara kalshoveni* sp. n., Java, Oct., 1932 (Phot. IPZ)

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- F. T. Valck Lucassen et al. — Monographie du genre Lomaptera Gory & Percheron (Coleoptera, Cetoniidae), prijs f 50.—.
- 1. A. J. Besseling. — De Nederlandse Watermijten (Hydrachnellae Latreille, 1802), prijs f 25.—.

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SOME ODONATA OF RAPA ISLAND, WITH DESCRIPTIONS OF THREE POLYNESIAN SPECIES OF ISCHNURA CHARPENTIER

BY

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Abstract

The writer reports on a collection of Odonata from the South Sea island of Rapa. Among the 4 species recorded, one, *Ischnura thelmae* spec. nov., is described from both sexes as new. Two other members of the same genus, previously only known from the types, are *I. spinicauda* Brauer, 1865 (Polynesia) and *I. taitensis* Selys, 1876 (Tahiti). These are re-characterized and figured, the last-mentioned species after fresh topotypical material from the Society Islands. *I. cheesmani* Fraser, 1942, also from Tahiti, is considered synonymous with *I. taitensis* Selys.

The present paper deals with a small collection of Odonata made in the island of Rapa, in the South Pacific, by Dr. J. F. GATES CLARKE and his wife, Mrs. THELMA M. CLARKE. The main object of this visit was to investigate the micro-lepidoptera of that remote island, but fortunately other insects were also collected. This trip was undertaken in 1963 in behalf of the United States National Museum, Washington D.C., and made possible by a grant supplied by the Office of Naval Research. I am much indebted to the authorities of the above museum, particularly Messrs. J. F. GATES CLARKE and OLIVER S. FLINT, Jr., for the privilege of examining this material, which includes a species of *Ischnura* apparently new to science. The receipt of this collection offered a welcome opportunity to re-characterize at the same time two other species of *Ischnura* also reported from the South Pacific. These species, of uncertain status since the time of their description, are *I. spinicauda* Brauer, 1865, and *I. taitensis* Selys, 1876, both of them hitherto known only from the types. A re-examination of the former was made possible by the courtesy of Dr. MAX BEIER, of the Naturhistorisches Museum, Vienna; Dr. G. DEMOULIN has been kind enough to lend me the types of *I. taitensis* from DE SELYS's collection in the Institut royal des Sciences Naturelles at Brussels. I wish to express my best thanks also to Dr. J. L. GRESSITT, of the Bernice P. Bishop Museum, Honolulu, for his continuous help and generosity in letting me study the extensive collections of Odonata accumulated by him and his co-workers in various parts of the Indo-Australian and Pacific areas.

The following information is based on the results of the "St. George" Expedition to the South Pacific whose members, Mr. C. L. COLLENETTE and Miss C. E. LONGFIELD, were probably the first to make entomological collections on Rapa during

their stay on the island, from April 10 to 18, 1925. Miss LONGFIELD very kindly furnished me with several interesting publications giving full details of Rapa and other southern Pacific islands. I have selected a few of the most important amongst these for inclusion in the list of references, COLLENETTE's fascinating book, so well illustrated by Miss LONGFIELD, being certainly most helpful in visualising the conditions met with by these explorers.

RAPA ISLAND

The next particulars of the oceanic island of Rapa (also known as Oparu) are extracted in part from an article on its flora by L. A. M. RILEY in the *Bulletin of Miscellaneous Information*, no. 2 (1926), issued by the Royal Botanic Gardens, Kew.

Rapa is situated in $27^{\circ} 36' S.$, $144^{\circ} 17' W.$, and is five miles in length by four in breadth. It is of volcanic origin with steep jagged peaks, the highest of which rises to 2077 feet. In shape it resembles a misshapen letter C, thickened towards the north and south, with the interior occupied by Ahurei Bay, which fills the bed of an ancient crater and opens to the sea on the eastern side. Excellent maps and photographs of its topography are contained in COLLENETTE (1925) and CHUBB & SMITH (1927). The island is little visited by vessels and, according to the first author, the natives still use the candle-nut (*Aleurites moluccana*) for illumination in preference to oil. As COLLENETTE writes, the neighbourhood of the village of Ahurei presents little of botanical interest, but the island possesses many streams, which are utilised on the lower ground for the irrigation of extensive taro beds (*Colocasia*), the principal food of the inhabitants. The greater part of the hill slopes are covered with a growth of short grass and a species of fern, larger growth being kept down by grass fires and by the high winds which bend and deform any isolated unsheltered trees. Thick vegetation clothes some of the higher peaks, the sheltered and damp gullies down to sea level, and the slopes of detritus at the foot of cliffs. At about 500 feet a tree-fern makes an appearance, becoming more plentiful as the elevation increases and eventually completely dominating all other trees.

To appreciate the remoteness of this little island reference should be made to a map. Associated with Rapa at some distance are the much smaller Marotiri and the Neilson rock and reef; otherwise the next neighbours are the Austral group (Tubuai Is.), the nearest 250 miles distant, but these are also mere scattered specks, and the Cook group at 800 miles no better. It may be added that the Society Islands (with Tahiti and Borabora) and the Tuamotus are situated about 750 miles toward the north, Pitcairn almost 900 miles due east-northeast, Samoa being about 1600 miles, Fiji almost 2000, and the Kermadec group approximately 2100 miles away.

As far as I am aware no dragonflies have yet been recorded from Rapa. With the exception of the new *Ischnura*, which in all probability is endemic in the island, all specimens contained in the present collection belong to species having a very wide distribution.

LIST OF SPECIES

Coenagrionidae

Ischnura a. aurora Brauer, 1865 (Fig. 3)

Material. — 18 ♂, 15 ♀, Rapa, Haurei, 6-16 and 28.IX.1963.

All females belong to the heterochromatic, dark colour form.

This little dragonfly is a wind-borne species, breeding in stagnant waters of every kind. Originally described from Tahiti it is distributed far beyond its many oceanic settlements, ranging from northwest India and Ceylon through southeast Asia, Australia and New Zealand. Chiefly coastal throughout the South Sea islands and elsewhere, *I. aurora* also has a number of isolated montane habitations in parts of Java and New Guinea, where it seems to have firmly established itself. Remarkably enough, a distinctive subspecies, lacking blue markings on the terminal segments of abdomen, has developed in the mountain valley of the Baliem River (Central North New Guinea) and occurs nowhere else on that continent. A second red-bodied *Ischnura*, nearly related with *I. aurora* but specifically distinct therefrom, was discovered in the Arfak Mountains of the Vogelkop, in West New Guinea. For further particulars, including references, notes on the distribution, and an account of the larvae of some species, see LIEFTINCK (1949, 1959 and 1962).

Ischnura thelmae spec. nov. (Fig. 1)

Material. — A small series comprising both sexes, described hereafter.

Libellulidae

Diplacodes bipunctata (Brauer)

Material. — 31 ♂, 26 ♀, Rapa, Haurei, 8-28.IX and 1-28.X.1963.

This is also a common and wide-ranging dragonfly, from the Moluccas eastward far into the Pacific; it has been reported from almost all Polynesian island groups, but goes high up into mountainous areas all over its range.

Pantala flavescens (F.)

Material. — 23 ♂, 23 ♀, Rapa, Haurei, 11-28.IX, 3-31.X and 4.XII.1963.

Tropics and warmer temperate countries of the world; almost cosmopolitan, with strong migratory habits and probably also wind-carried.

N.B. — After the completion of this paper I received a letter from Mr. D. E. KIMMINS, of the British Museum (Nat. Hist.), in which he tells with regard to the Rapa Island Odonata, that the following species are represented in the collection: *Ischnura aurora*, *Diplacodes bipunctata* and *Pantala flavescens*. These were collected by Mr. COLLENETTE and Miss LONGFIELD during the "St. George" Expedition and labelled as collected by the former. Being obviously common species, presumably only a single pair of each of these was taken.

DESCRIPTIONS

Ischnura thelmae spec. nov. (Fig. 1)

Material. — 10 ♂, 2 ♀ (partly immature or discoloured), Rapa Island: Pt. Tepai Kutautau, 4.X.1963 (♂); Rapa Maii Bay, 23.X.1963 (2 ♂); Rapa Mau-gaoa, 1000 ft., 5 and 7.X.1963 (5 ♂) and 950 ft., 11.XII.1963 (2 ♂); Rapa Haurei, 18.IX and 3.XII.1963 (2 ♀, one with collector's note: "Coral red thorax"). All collected by Dr. J. F. GATES CLARKE and Mrs. THELMA M. CLARKE. Holotype ♂ and allotype ♀, Rapa Maii Bay, 23.X.1963 and Rapa Haurei, 3.XII.1963, respectively, in USNM (holotype ♂, reg. no. 68921). Paratypes of both sexes in USNM and the Leiden Museum.

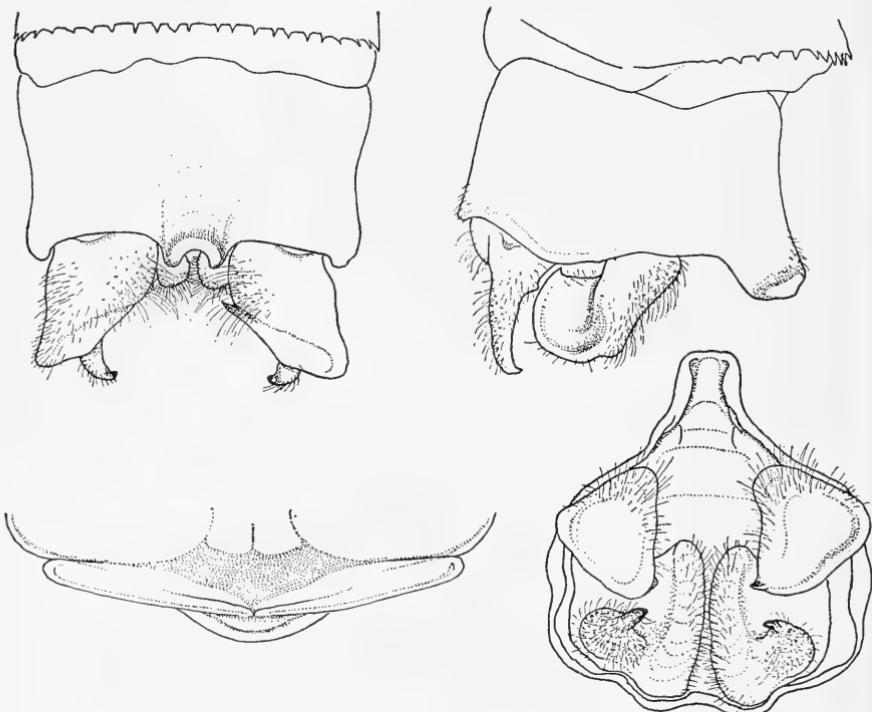


Fig. 1. *Ischnura thelmae* spec. nov., Rapa I. Terminal segments of abdomen and appendages of ♂ holotype, dorsal, left lateral and caudal view; posterior lobe of prothorax of ♀ allotype, dorsal view

Dr. GATES CLARKE informs me that the species was generally found at fairly high elevations and believes that the immature stages will be found in the axils of the leaves of *Freycinetia*. This plant is abundant on the steep hillsides and occasionally overlaps into the flat areas along the ridges of Rapa.

Male (adult). — Labium pale yellow. Labrum, mandible-bases, genal area, anteclypeus, and vertical surface of frons greenish yellow, this colour extending upward along margin of compound eye to a level about half-way the distance between fronto-clypeal suture and median ocellus; basal one-third of labrum shiny

bronze-black, forming a transverse mark slightly produced forward in the middle. Postclypeus black with brilliant bronze-green reflex, its surface finely transversely wrinkled and sparsely clothed with long yellow hair, especially so along front margin. Posterior limit of pale frontal stripe very irregular, the area surrounding the antennal sockets remaining black; there is an additional black spot, shaped like a broad triangle, placed in the middle of the frons at its base. Antennal sockets yellow green in front, the first antennal segment finely ringed with yellow apically; rest of antennae black. Dorsal surface of head, including occipital ridge, bronze-black with metallic green and coppery reflections; occipital lobes tumid, produced backwards as an obtuse-angulate swelling on either side, dorsally with a pair of moderately large, completely isolated, subcircular, blue postocular spots. Rear of the head mat black with a very large, oval, greenish yellow area adjoining the eyes on either side.

Prothorax shaped and coloured much as described for *I. taitensis*; anterior lobe, lower parts of pleurae, and a streak along lateral margin of posterior lobe, greenish yellow. Posterior lobe short and broad, the transverse ridge-like lateral divisions raised on either side of the middle, where they are lowest and gradually become obsolete; median division swollen, placed on a slightly lower level and produced backward as a short rounded lamella. Lamina mesostigmatis transverse, subtriangular in outline, strongly hollowed out dorsally; colour black, except the swollen hind margin, which is yellow, terminating on either side in a conspicuously raised and recurved bluntly triangular tubercle.

Synthorax, ground colour light yellowish- to bluish-green, the dorsum and part of the sides bronze-black with metallic green lustre; pattern very similar to that of *I. taitensis*, the antehumeral stripes a little narrower and straighter, widest and more or less club-shaped at extreme base, their upper extremities hardly noticeably expanded; outer border of dark humeral band lacking an angular extension at the shoulder-area, but recurved upper streak and marginal lines along dorsal crests present; black stripe at second lateral suture complete, slightly irregular and variable in width, widest dorsally and more or less forked at the metinfraepisternal suture. Remaining parts of thorax and striped pattern of legs exactly as described for *I. taitensis*.

Wings hyaline, neuration brown; 13—16 Px in fore wings, 11—13 in hind wings; 3 postquadrangular antenodal cells. There are two rows of cells between C and R_1 posterior to the pterostigma in one of the Rapa Maii Bay specimens, whereas in 5 others several cells are divided in one or more of the wings; lastly, in 4 males only a single cell-row is present. Arculus situated at Ax_2 , more rarely a trifle beyond that level in all wings. Course of Cu_2 in fore wing straight as far as the end of first to second cell beyond level of subnodus, thereafter strongly fractured and reaching the wing margin at about $Px_{6.7}$; in hind wing this vein ends its unbroken course at level of Px_2 , the fractured portion terminating at level of $Px_{7.8}$. Pterostigma not very different in shape and size in fore and hind wings, very oblique and distinctly higher than long in both pairs, this cell in fore wing differing from that of the hind wing only in that the outer distal angle is more drawn out, the anal side being, moreover, definitely outwardly convex. Colour of all pterostigmata dark brown surrounded by light chrome (possible bluish in life?).

heavily framed in dark brown; outer angle of fore wing *pt* including the inner margin of same more extensively pale-coloured than that of the hinder pair.

Abdomen shaped similarly to that of *I. taitensis*, the basal and terminal segments moderately expanded. Bronze-green markings of segm. 3—6 complete though less broad than those covering 1—2 and 7—10, widest basally and near apex of segments, where they are attached to complete, deep black apical rings; markings on the rest of the segments restricted to the dorsum, leaving not only narrow, transverse subinterrupted basal annules but also the whole of the sides chrome yellow. The complete dorsal marks of segm. 1—2 are shaped as in *I. taitensis*, the intersegmental annules being bright blue, as in that species. Terminal segments almost entirely black; latero-ventral border of tergites 8 and 9 narrowly striped with yellow, the intersegmental membranes of segm. 7—8, 8—9 and 9—10 likewise pale. Apical portion of segm. 10 strongly pinched and in the form of a prominent dorso-apical tubercle, the hind border of which is whitish apically, as shown in the figure. The penis has the shape and armature characteristic for the genus, i.e., the second segment carries a pair of robust divergent, almost straight, backwardly directed black spines, one on each side of a bluntly raised median tubercle, the slightly recurved tips of the spines reaching the dome of the third segment; this latter terminates in two ribbon-like recurved processes, much longer than the spines, shaped similarly to those figured by FRASER (1927) for the Samoan ischnurine *Amorphostigma auricolor* Fraser.

Anal appendages shaped as in fig. 1, similar to those of *I. taitensis* but differing in details of structure. Superior pair black, the lower part of the basal portion yellowish interiorly; surface shiny and clothed with the same longish hair as seen in *taitensis*. In some males the dorsal angulation of the superior appendage, just before the bend, is better pronounced than in others, forming a blunt, backwardly directed tooth-like projection, which is only poorly developed in the specimen figured.

Female (heterochromatic, orange colour form). — Labium pale yellow. Mouth-parts, face, and frons anteriorly, extensively orangish (between chamois and cinnamon, RIDGWAY). Black stripe at base of labrum ill-defined, acquiring soon a rusty brown tint and turning gradually to chrome beyond the median impression; postclypeus as in male, except that a transverse ferruginous spot is clearly discernible mid-basally. Dorsal surface of head orange with an irregularly shaped bronze-black band, widest in the middle, connecting the eyes across the vertex; the anterior border of this band is excavated on either side between median ocellus and antennal socket so as to save a prominent crown-shaped black dot placed immediately in front of the median ocellus. Antennal sockets orange, the segments themselves black. Epicranial lobes entirely orange, confluent with a transverse stripe at the occipital crest, this colour also occupying most of the occipital lobes ventrally, only the area surrounding the foramen remaining deep black.

Prothorax orange, save for a V-shaped black spot in the depression behind anterior lobe and a thick transverse bronze-black mark at the base of the posterior lobe, which itself is orange and shaped almost exactly as in the male (fig. 1). Lamina mesostigmalis less strongly concave dorsally than in male, the inner angle of its posterior rim not strongly protuberant but rounded and beset with a tuft of

long yellow bristles which are directed straight upward; colour orange with a black dot filling up the inner anterior angle of the lamina.

Synthorax throughout orange, marked with a sharply delimited, parallel-sided bronze-black mid-dorsal band leaving the outer one-half of the mesepisterna uncovered. Antealar triangles, axillaries and notal sclerites orange; thoracic sides and ventral surface orange, but the former with a continuous black line at the humeral suture and a tiny black streak at upper end of second suture.

Legs light orange, but all spines black; vestigial black spots are present at the junction of the trochanters and femora and also at the apices of the latter; outer faces of anterior and middle tibiae with an obliterated black stripe, the extremities of all tibiae and tarsal segments likewise black.

Wings clear, neuration brown, lighter towards the bases; 14 P_x in fore wing, 12 in hind wing. Pterostigma lozenge-shaped, greyish yellow, smoky grey in the centre; slightly less oblique and a trifle more expanded (longer) than in the male, shaped similarly in fore and hind wings; 1—3 duplicated cells between C and R_1 only in the hind wings.

Abdomen, ground-colour orange; dorsum of all segments (save the basal ones) marked more broadly with metallic greenish black than in the male and differing as follows: segm. 1—2 throughout orange, the intersegmental annule of 2—3 brown; 3 with the dark band narrower than those on the succeeding segments, tapering forward and not quite reaching base of segment; orange rings at base of segm. 4—7 slightly wider than in the male and not interrupted by black in the median line; terminal segments unmarked save for diffuse light spots low down at the sides of 9 and 10. Apex of 8th sternite abruptly constricted so as to form a short, tooth-like, black vulvar spine. Valves and anal appendages obscured, outer gonapophyses with a yellow stripe; styli black.

The second female is an old adult specimen which differs from the previous one by having the body much darker generally. All orange tints are replaced by light brownish olive, the postocular spots also being much obscured. Markings dull bronze brown to black, the basal stripe of labrum and entire postclypeus very shiny. Black stripe at humeral and second lateral sutures of thorax slightly wider than in the other female, the last-mentioned stripe linear but complete, extending along full length. Wing membrane greyish yellow, venation almost black. There are 14 P_x in the fore wings, 13 in the hinder pair. Abdomen with indication of a dark sub-apical transverse marking placed on mid-dorsum of segm. 2.

Measurements: ♂ abd. + app. 30.5—34.0 mm, hind wing 19.2—21.0 mm; ♀ 28.0—28.4 mm and 22.0 mm, respectively; most males measure 33 mm for the abdomen and 20 mm for the hind wing.

This interesting new species is chiefly remarkable for its large size, it being far superior in this respect to any other Old World member of the genus and even larger than the two described species of the allied *Amorphostigma* from Samoa. The male has the facies of a compactly built *Teinobasis* or *Nesobasis*, but the head is larger and all characters are decidedly those of a typical *Ischnura*. Apart from its dimensions, the male of *I. thelmae* is easily distinguished from its congeners by the bulging epicranial lobes, unmarked terminal segments of abdomen, as well

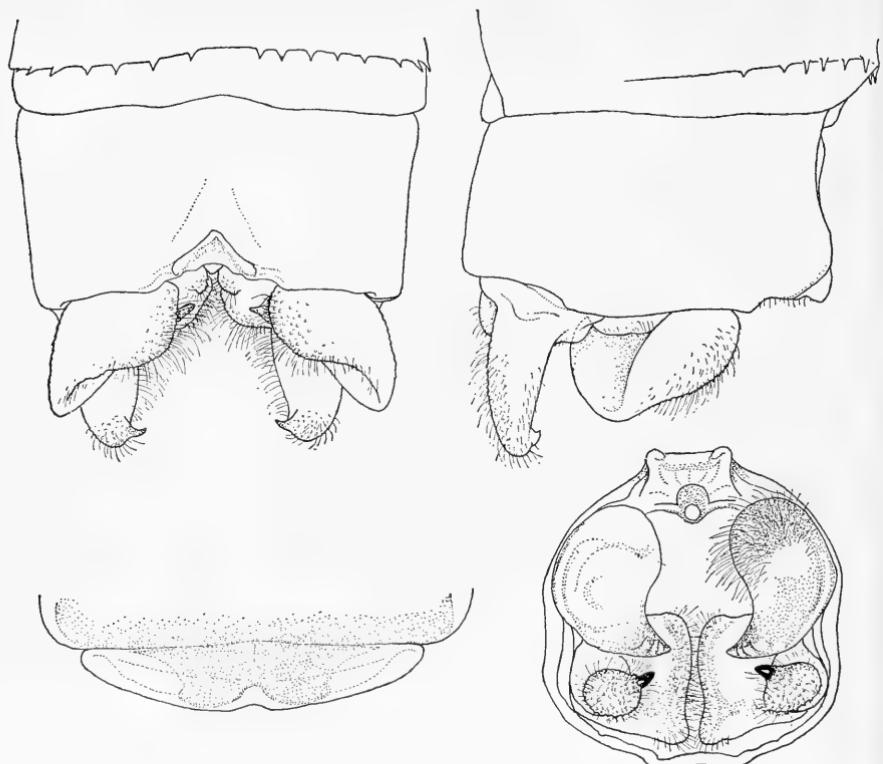


Fig. 2. *Ischnura taitensis* Selys, Tahiti (Fautaua). Terminal segments of abdomen and appendages of ♂, dorsal, left lateral and caudal view; posterior lobe of prothorax, dorsal view, of ♀ from Ape-Aotai trail

as by the shape of its anal appendages. In the last two characters it approaches *I. taitensis* Selys fairly closely, these two species being undoubtedly nearly related, taking an isolated position within the genus.

I have much pleasure in dedicating this dragonfly to its discoverer, Mrs. THELMA M. CLARKE.

Ischnura taitensis Selys, 1876 (fig. 2)

1876. SELYS, Bull. Acad. Belg. [2] 41: 279—280 (35—36 sep.). — ♂ ♀ Ile de Tahiti (*I. taitensis* sp.n.)
 1942. FRASER in MUMFORD, Ann. Mag. Nat. Hist. [11] 9: 646—647, fig. 1—2 (♂ app.), 3 (pterost. of fore wing). — ♂ Tahiti (*I. cheesmani* sp.n., syn. nov.)

Material. — ♂ (juv., holotype), ♀ (semiad., allotype), both labelled by DE SELYS "Tahiti" and "taitense Selys" (♂) or "taitense" (♀) on pinkish labels (IRSN); ♂ (ad.), Tahiti, Mt. Aorai, NW Ridge, 1400 m, 11.VII.1961, native collector (BISH); ♂ (ad.), Tahiti, Fautaua near Papeete, 25 m, 5-11.VII.1961, Malaise trap, J. L. GRESSITT (ex BISH, ML); 2 ♀ (ad., isochromatic), Tahiti, Faie Rau Ape-Aotai trail, 15.II.1962, N. L. H. KRAUSS (BISH & ML).

Male (ad., Fautaua). — Labium pale ochreous, its median area glaucous. Labrum green with the basal one-third in the form of a sharply defined glossy black band which is slightly produced forward and obtuse-angulate medially. Mandible-bases, genae and anteclypeus bright green, the light area on the genae extending upwards along the eye-margin to a level almost as far as the median ocellus. Postclypeus shiny metallic greenish black, its surface rather convex, finely transversely wrinkled. Anterior surface of frons on each side of the middle with a two-pronged green mark directed obliquely inward, the branches of this spot divergent, narrow and tapered, the anterior branch a little longer than the posterior one and separated by black in the median line. Head otherwise deep bronze-black above with slight metallic green lustre; a tiny yellow dot in front of the median ocellus, and epicranium with a pair of large and conspicuous, bright blue, subtriangular postocular spots, which are on all sides surrounded by black. Occipital crest unmarked. Rear of the head bicoloured: outer half of the surface bright blue, the inner half black with a comma-shaped dark off-shoot invading the blue colour towards the eye-margin. Antennae black, apex of first segment narrowly ringed with blue.

Prothorax predominantly bronze-black, anterior lobe bright blue finely bordered with black anteriorly; pronotal tubercles and most of the sides black, the former evenly convex; posterolateral portion of proepimerum including the lower processes, green. Posterior lobe short, consisting of three portions: lateral divisions directed almost straight upward and separated from one another by a shallow emargination, the midlobe a little more swollen, placed on a slightly lower level and directed caudad; whole structure black, except the lateral divisions whose outer rims are bordered with green. Lamina mesostigmalis subtriangular in outline, dorsal surface of each strongly hollowed out with raised swollen margins which themselves bear a bright green halter-shaped mark posteriorly.

Dorsum of synthorax, to a level about half-way between humeral and first lateral suture, deep black with slight metallic blue lustre; with a pair of complete, parallel, bright green antehumeral bands, which are distinctly widened, more or less club-shaped, on either end, extending almost as far as the ante-alar triangles at their upper extremities; mesepisternal dark colour irregularly bordered externally, encroaching on the blue of the thoracic sides to form a squarish extension upon the shoulder area and a short recurved streak invading the blue near the dorsal crest of the mesepisternum; mesinfraepisternum black with a triangular mark of blue-green adjoining the mesocoxa. Sides otherwise bright blue with a complete irregular black stripe on the second suture; this stripe widened (though also constricted) towards the dorsal crest; metinfraepisternum yellow-green outlined with black at the upper suture; ventral surface lemon yellow. All scutellar areas, wing processes and axillaries spotted with blue.

Legs bright ochreous green, the coxae each with a tiny dark basal spot and all femora heavily striped with black exteriorly; tibiae and tarsi dark ochreous, outer faces of anterior tibiae also with a continuous black stripe, but stripes along posterior two pairs of tibiae obliterated; the basal one-third of inner faces of tibiae likewise black; tarsal segments black-tipped.

Wings hyaline, neuration brown; 10 Px of first series in fore wing, 9 in hind

wing; 3 postquadrangular antenodal cells; arculus at or a little distal to Ax_2 in both pairs of wings; course of Cu_2 straight as far as the end of the third or fourth cell following the quadrilateral in fore wings, of the fourth or fifth in the hind wings. Pterostigma dissimilar in shape and size in fore and hind wings, all very oblique; pt of fore wing about one-fourth longer than that of hind wing, sides strengthened and a little outbent in all wings. Fore wing pt two times longer than high, the proximal side only half the length of costal side and a little shorter than the distal one, which is more oblique; distal and anal sides forming a single convexity; costal side black but inner margin of distal side blue on upper surface; colour of cell jet-black dorsally for its proximal three-fifths, bright blue for the rest, with a yellow streak along costal margin; ventrally the cell is black save for a similar streak along costa. Hind wing pt only little longer than high, lozenge-shaped, almost parallel-sided; colour grey-brown on either surface and surrounded by a yellow line.

Abdomen of the usual shape and colour, marked broadly with bronze-black on the dorsum of all segments, the two basal ones rather more brilliant and more greenish black than the next; all markings a little expanded subapically and broadly attached to narrow black apical rings. Intersegmental membrane of segm. 1—2 bright blue, those of the intermediate segments obscured, and of 8—9 and 9—10 yellowish (possibly blue in life?). Segm. 3—7 have narrow clear yellow basal annules finely interrupted by black on mid-dorsum. Sides of segm. 1—2 blue, base of 3 blue-green, and of the remainder clear ochreous. Terminal segments unmarked, except laterally, the raised and excavated posterior border of segm. 10 yellow, as shown in the figure. Anal appendages shaped as in fig. 2; superior pair black, smooth and shiny interiorly, clothed with long pale pubescence above and within; inferior appendages a little longer and much more slender, their colour ochreous, save the outer border and apices, which are black.

Penis shaped similarly to that of *I. thelmae* (antea: 94), the backwardly directed black spines of the second segment are longer, the apices acute and rather abruptly downcurved; terminal processes of third segment shorter and narrower than in *thelmae*, evenly curved, about equal in length to the spines of second segment.

The above male corresponds in every respect with what has remained of the holotype, which is an incomplete specimen, quite immature, and lacking most of its abdominal segments. The 10th segment and left pair of anal appendages are, however, still intact in the type, whose characteristic face marks and enlarged post-ocular spots are still clearly shown.

The third male now before me, from Mt. Aorai, is far superior in size. It is a discoloured specimen, but as far as can be seen its markings are similar, except that the black lateral thoracic stripe is slightly wider; the blue antehumeral bands are, on the contrary, somewhat narrower than in the example described. The 10th segment and anal appendages are identical in shape, but the form of the pterostigmata in the Mt. Aorai male is rather different: in both pairs of wings it is shorter, only little longer than high in the fore wing and even slightly higher than long in the hind wing. It has also 11 instead of only 10 Px in fore wings, 9 in the hinder pair.

Female (isochromatic). — Labrum blue-green, the black basal stripe narrower

than in the male, occupying about one-fourth of whole depth of labrum. Mandible-bases and anteclypeus chrome yellow; genae light green, this colour extending upwards along the eye margin as far as the antennal sockets, which themselves are likewise green; postclypeus and a transverse crescent at the frontoclypeal suture, bronze-black; horizontal part of frons in the middle, as well as the rest of the dorsal surface posterior to it, bronze-black, with the exception of a light triangle in front of the median ocellus, a pair of very large subcircular postocular spots, and a greenish transverse stripe at the occipital crest.

Prothorax as in the male, except that each of the pronotal tubercles bears a green lateral spot, varying in size and shape. Posterior lobe shaped much as in the male, but lateral lobes less strongly upcurved, directed obliquely backwards and separated from one another only by a shallow emargination on a slightly lower level than the margins on either side of it; median division vestigial, not projecting caudad and visible only when viewed from behind (fig. 2). Light-coloured areas of thoracic segments bright blue-green, turning to green laterally and chrome yellow underneath. Antehumeral stripes a little longer and wider than in the male, especially at either end, completely filling up the lower edges of the mesepisterna outwardly; bronze-black bands at the humeral and second lateral sutures narrower, the former with a linear extension along the dorsal crest.

Wings with 11 *Px* in fore wing, 9 in hinder pair; pterostigma of fore wing only about one and one-third larger than that of the hind wing, proximal and costal sides of equal length in both, but costal side in fore wing shorter than the anal and distal side more strongly convex than that of the hind wing; colour grey-brown surrounded by yellow.

Abdomen coloured and marked similarly to the male, the intersegmental membrane of segm. 1—2 blue, those of 7—8 and 8—9 yellow; vulvar spine short; appendages conical, obscured; valves light chrome, not surpassing apex of anal tubercles.

Measurements: ♂ abd. + app. 21.0 mm, hind wing 13.2 mm (Fautaua), 26.7 and 16.0 mm (Mt. Aorai), respectively; ♀ 25.8—26.5, 17.7—19.0 mm.

Both male and female types are at present in a very dilapidated condition, various body parts having been repeatedly mended since the time of description. Owing to the juvenile state of the male and the loss of colour in either sex, these insects could have been defined hardly better; all the same, SELYS's original description is inevitably quite misleading. *I. taitensis* is, in fact, a brightly coloured insect, chiefly distinguished from other species by the following combination of characters: (1) exceptionally large size of blue postocular spots; (2) conspicuous blue-and-black pterostigma of male fore wing; (3) absence of colour marks on terminal segments of abdomen, and (4) shape of 10th abdominal segment and anal appendages of the male.

The discrepancies in size and details of the venation between the Mt. Aorai and Ape-Aotai specimens on the one hand, and the types (along with the male from Papeete) on the other, are worthy of note. These can probably be explained by the former having been taken at a much higher level than the latter. Ecotypic differentiation of forms with an extensive and fairly continuous vertical distribution is a common phenomenon also among dragonflies. Several examples are now

known of species in Java, Celebes and New Guinea ranging from the coastal forests into the lower mountain zone, or even much higher, whose representative populations remain unchanged structurally but at higher elevations show a marked increase in size combined with an obscured colour design and various deviations of the more 'normal' wing venation.

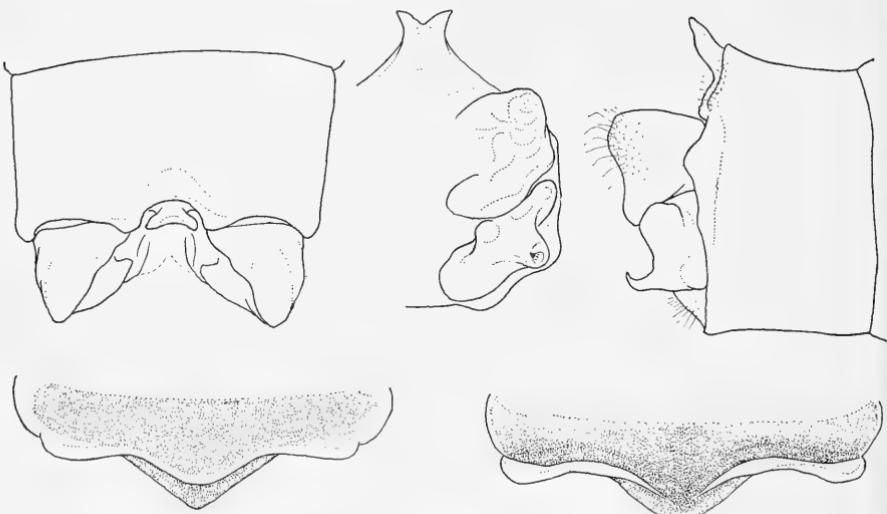


Fig. 3. *Ischnura spinicauda* Brauer, holotype from "Polynesien". Terminal segment of abdomen and appendages, dorsal, caudal and right lateral view (upper row). Posterior portion of prothorax, dorsal view of ♂ holotype of *I. spinicauda* Brauer (left) and *I. a. aurora* Brauer, ♂ from Tahiti (right) (lower row)

I. taitensis is obviously the same species as *I. cheesmani* Fraser in MUMFORD (1942: 646—647), described from a single male in the Royal Scottish Museum, Edinburgh. This came from Hitiaa, Tahiti, 10 July, 1925, L. E. CHEESMAN coll., and is stated by its describer to be "easily distinguished from *I. taitensis* Selys, by the presence of a lateral black stripe on thorax"; which is, in fact, exactly one of the characters of *I. taitensis*. For the rest, FRASER's description is grossly superficial and his figures are worthless. All characters given for *cheesmani* in the description also apply to *I. taitensis* and hence there can be no doubt that the two are conspecific.

Still another endemic *Ischnura* from the Society Islands (Raiatea and Bora), apparently known only from two males in the British Museum, is *I. cardinalis* Kimmins (1929). Like *I. aurora*, the male is characterized by a variegated body pattern consisting of orange, blue and bronze-black; but *I. cardinalis* is superior in size and easily distinguished from other species by the blood red fore wing pterostigma and the great length of the inferior appendages of the male, the latter being over two times longer than the superior pair.

Ischnura spinicauda Brauer, 1865 (Fig. 3)

1865. BRAUER, Verh. zool.-bot. Ges. Wien 15: 511 (latin diagnosis). — ♂ Polynesien (*Agrión* [*Ischnura*] *spinicauda* n.sp.)

1866. BRAUER, Neuropteren, in Novara Expedition, Zool. 1: 57—58, tab. I fig. 13 (♂ app.). — ♂ "Polynesien (ohne nähere Angabe)" (*Agrion [Ischnura] spinicauda*).
 1876. SELYS, Bull. Acad. Belg. [2] 42: 990—991 (additional note).

Material. — ♂ (holotype), labelled "Ischnura spinicauda Br. Polynäs." (BRAUER's writing), "Ischnura spinicauda Br. ♂ Type, Novara Reise 1857—59"; in the Naturhistorisches Museum, Wien.

For many years I, and possibly other students with me, have been looking about for this remarkable species. If in the last decades it had been at all represented in the many collections brought home from the various island groups in the Pacific, it would surely have been recognized. Up to this time it has, however, never been found again. With its nearest ally, the widely distributed *I. aurora* Brauer, the unique type of *I. spinicauda* is probably the fullest and best described member of the genus; for a general characterization the reader is, therefore, referred to the original description. A re-examination of the type reveals the following differences as compared with topotypical examples of *I. aurora* in our collection:

spinicauda

Posterior lobe of prothorax trilobate, the edges of the lateral divisions evenly rounded and only slightly raised and thickened; upper portion of median division on level with the lateral ones and with a continuous pale border; triangular lower portion of median division (midlobe) projecting caudad on a slightly lower level (fig. 3, left).

Abdomen, segm. 3—7 orange-red, scarcely and indistinctly obscured apically, 7 with bronze-black apical mark tapered to a point toward base and occupying terminal one-third or a little less of segment.

Bifid dorso-apical tubercle of segm. 10 more strongly raised, the tubercles closely approximated, arising from a narrow, rather pinched basal cone (fig. 3).

Sup. anal app. in lateral view with its apex above more broadly rounded; outer branch of inf. app. longer, ending in a strongly upcurved finely pointed hook (fig. 3).

aurora (Tahiti)

Posterior lobe of prothorax trilobate, the edges of the lateral divisions more swollen and prominent but ridges gradually declining towards the middle and interrupted medially at a point where the surface is sunk; lower portion of median division similar to *spinicauda* (fig. 3, right).

Abdomen, segm. 3—6 orange-red with finely black terminal rings, 6 with subapical bronze-black mark, variable in shape and size, usually attached to a black ring at apex of segment; segm. 7 wholly black.

Bifid dorso-apical tubercle of segm. 10 lower, the tubercles well separated from each other by a shallow emargination.

Sup. anal app. in lateral view more elongate and narrowly rounded at apex above; outer branch of inf. app. thicker and more evenly upcurved.

As pointed out in BRAUER's more elaborate description contained in the "Novara Expedition", *I. spinicauda* can be distinguished from *aurora*, apart from the colour differences, by the more prominent process at the apex of the 10th segment and also by the shape of the appendages. BRAUER's figures of the former are, however, not quite correct and rather exaggerated. I am, therefore, giving camera lucida drawings of these terminal structures taken from the type specimen, the origin and proper habitation of which still remain unknown.

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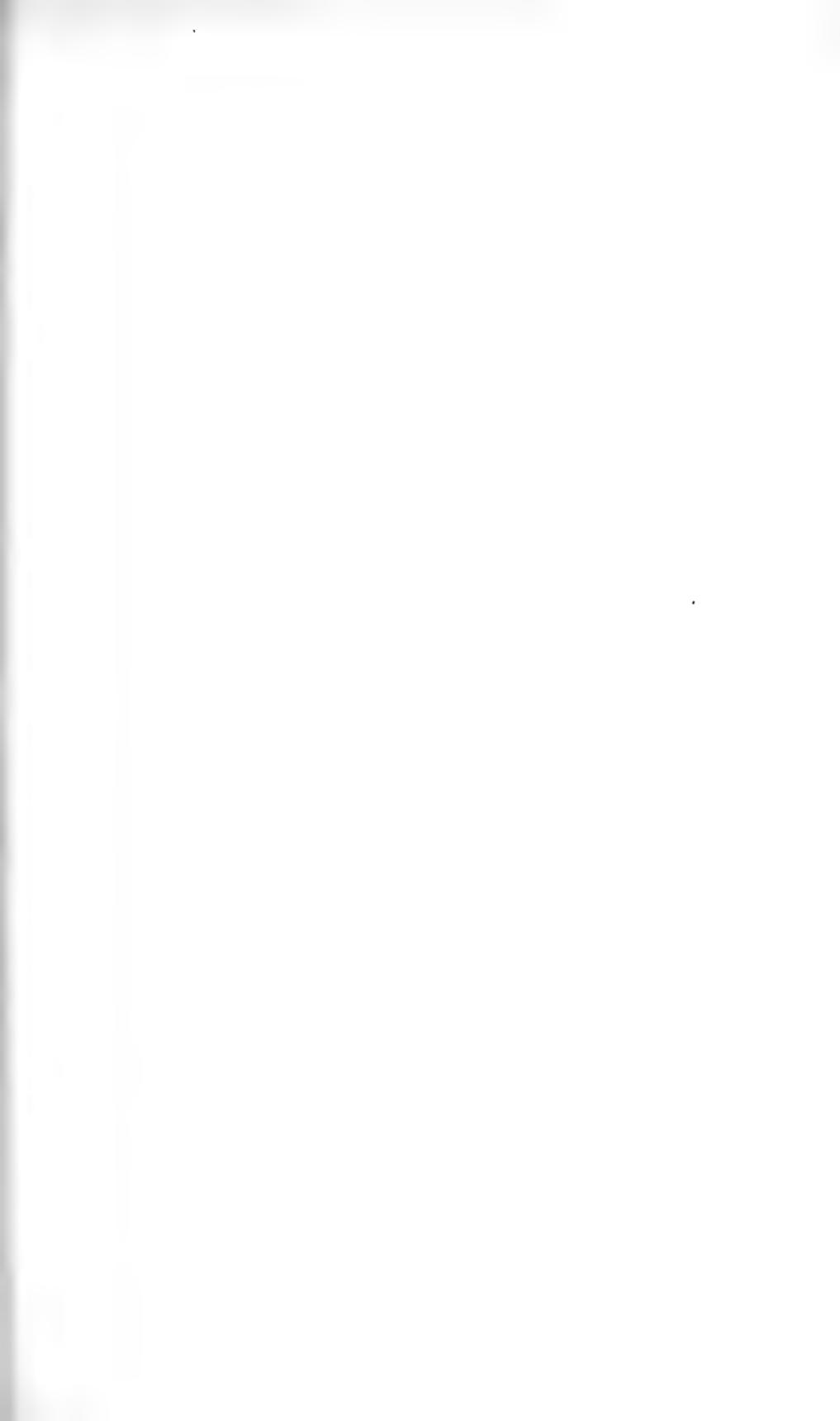
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INHOUD:

IOSIF CAPUSE. — New and rare Palaearctic Tineidae (Lepidoptera), p. 103—124,
Fig. 1—49.

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NEW AND RARE PALAEARCTIC TINEIDAE (LEPIDOPTERA)

BY

IOSIF CAPUSE

Bucharest, Rumania

In the present paper which forms a continuation of my studies on the family Tineidae, descriptions are presented of a new genus, two new species and one new subspecies. Furthermore remarks are made on morphological characters of some other species not dealt with in the literature so far.

The systematic arrangement of the material is that proposed by G. PETERSEN.

The author wishes to express his thanks to Dr. A. DIAKONOFF, who kindly read the manuscript of the present paper.

NEMAPOGONINAE

Cephimallota libanotica Petersen, 1959 (Fig. 1)

Head orange-yellow. Antennae brown-yellow. First antennal joint nearly twice longer than broad, and four times longer than second joint. Labial palpi brown-yellow. Maxillary palpi somewhat longer than labial, yellowish. Galeae not surpassing half length of labial palpi. Thorax grey-brown, tegulae concolorous, with a few lighter scales on posterior edge. Forewing without pattern, blackish brown, darker on the underside, posterior half lighter. Upper and under side of both wings with a faint violaceous gloss. Legs yellowish-brown with yellow bands on ends of tarsal joints.

In one of the specimens examined the colour and shape of the wings are asymmetrical: in the right forewing the apex is a little more truncate, while near it there is a rectangular spot, lighter than remainder of wing.

Male genitalia. Tegumen and vinculum forming a large ring. Vinculum with a rather long slender saccus. In dorsal view uncus with two cusps, reaching beyond posterior margin of valvae. A deep median excavation beset with numerous hairs. Arms of gnathos long-pointed. Valvae small, robust, densely haired. Anellus similar to that in *C. simplicella* (H.-S.).

Examined material. 1 ♂, Rumania, Baneasa wood, Bucuresti, 29.VIII.1960 (author); 1 ♂, the same locality, 15.VII.1961 (Dr. A. POPESCU-GORJ); 2 ♂, Ineu (coll. L. DIOSZEGHY); 1 ♂, Baile Herculane, 7.VII.1964 (author); 2 ♂, Ciresu-Pestera Topolnita, 27.VI.1964 (author).

Distribution. Lebanon, Greece (Peloponese), Yugoslavia (Macedonia), Albania, and Rumania.

TINEINAE

Tinea murariella Staudinger, 1859
(Fig. 2—3)

Head yellow; antennae brown. Labial palpi blackish-brown with a few light scales. Thorax and tegulae blackish-brown. Forewing with a blackish-brown ground colour. Three spots darker than ground colour: two in basal third and one in middle of wing. Hindwing grey-brown. Legs brown.

Male genitalia resembling those of *T. leonhardi* Pet., but differing by stouter aedeagus, absence of small hair-like cornuti, and presence of spines on large cornuti. In *T. murariella* Stgr. distal end of the valva is strongly narrowed; aedeagus 2,7 \times longer than valva. Tegumen, uncus, and gnathos normal.

Examined material. 1 ♂, Rumania, Ciungetu, 29.VII.1962 (D. DANCAU).

Distribution. Spain, southern France, Rumania.

According to PETERSEN (1959b : 569) *T. murariella* Stgr. is a western Mediterranean element while *T. leonhardi* Pet. is an eastern Mediterranean one. The occurrence of the species in Rumania proves that the actual range of *T. murariella* Stgr. is much wider than PETERSEN believed. Our present knowledge of the family Tineidae, however, does not allow of a delimitation of the geographical range of the species, many regions being insufficiently studied.

Tinea flavescentella Haworth, 1828
(Fig. 4—5)

Head yellow; base of antennae darker. Antennae light brown. Labial palpus yellow, externally and dorsally brown, its last joint dark brown with a lighter apex. Thorax yellow. Anterior half of tegulae brown, posterior yellow. Ground colour of forewing yellowish-brown. A dark brown spot on the base of costal edge. Marking similar to those in *T. pellionella* L., consisting of two hardly visible spots in basal half of wing and a well-defined spot at $2/3$ of wing length. Terminal part of forewing darker in colour. Hindwing greyish-yellow. Legs yellow.

Female genitalia. Sterigma medially with a strong concavity separating two lobes with short, hairy, rounded posterior edges. Ostium bursae strongly broadened. Bursa copulatrix, an elongate sack with three equal signa, each signum with a dilated base provided with one hair.

In PETERSEN's revision (1957—1958) this species is characterized by the presence of four signa; the specimen examined by me has only three.

Examined material. 1 ♀, Rumania, Eforie Sud, Dobrogea Region, 30.VI.1962 (author).

Distribution. The species has been collected in England, Ireland, France, Germany, Italy, Yugoslavia (Dalmatia), Algeria, Turkey, and Rumania.

Monopis nonimella Zagulajev, 1955

This species is very similar externally to *M. imella* Hb. from which it can be distinguished only by the genital characters.

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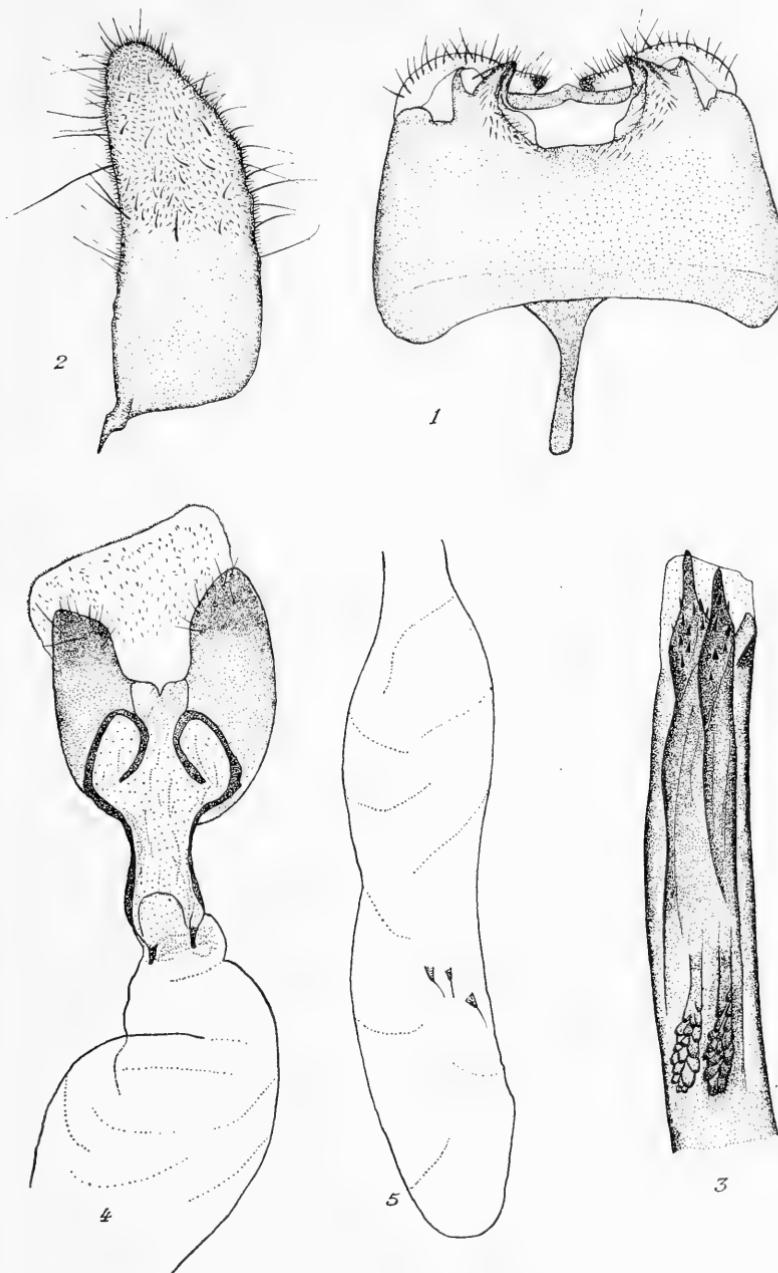


Fig. 1—5. Genitalia of Tineidae. 1, *Cephimallota libanotica* Pet., ♂, dorsal view of genitalia; 2, *Tinea murariella* Stgr., ♂ left valva; 3, the same, distal end of aedeagus; 4, *Tinea flavescentella* Hw., ♀, genitalia; 5, the same, bursa

Examined material. 1 ♂, Rumania, Eforie Sud, Dobrogea Region, 9.VII.1962 (author).

Distribution. USSR (Siberia, Kazakhstan, South Ural, Taganrog, Pskov), Yugoslavia (Montenegro), and Rumania.

MEESSIINAE

Type-genus, *Meessia* Hofmann, 1898.

Head with long, slender antennae; usually both pairs of palpi well-developed; maxillary palpi absent in *Lichenovora* Pet. Second joint of labial palpus usually provided with variable number of rigid hairs. Wings elongate, lanceolate, with pointed apex. Markings of forewing in most species forming transverse bands or dots of diverse size and of a different colour, irregularly scattered.

In most genera of the subfamily there is a more or less marked reduction of venation. Thus in the forewing the whole length of the radial trunk or parts of it are feebly marked (e.g., *Ischnoscia*, *Lichenovora*, *Lichenotinea*, *Phereoeca*, etc.). In some genera (*Ischnoscia*, *Obesoceras*) R_2 and R_3 , and in other (*Infurcitinea*, *Gozmanytinea*, *Lichenotinea*, *Meessia*), R_4 and R_5 are pedunculate. Sometimes R_5 (*Lichenovora*) or one of the median veins (*Obesoceras*, *Ischnoscia*) are missing. Veins A_1 (*Agnathosia*, *Lichenotinea*, *Ischnoscia*, *Obesoceras*, *Infurcitinea*, *Gozmanytinea*) and A_3 (*Celestica*) can be missing or weakly marked. Radiocubital cell, narrow and very elongate, is sometimes open (*Lichenovora*, *Phereoeca*).

The radial trunk in the hindwing is sometimes feebly marked or absent (*Lichenovora*, *Lichenotinea*, *Infurcitinea*, *Phereoeca*, *Celestica*); in some genera there are three median veins (*Lichenotinea*, *Infurcitinea*, *Gozmanytinea*, *Lichenovora*, *Phereoeca*), while in other there are only two (*Celestica*, *Ischnoscia*, *Obesoceras*, *Meessia*). In some genera the anal veins, generally feebly developed are present as a single vein (*Infurcitinea*, *Gozmanytinea*, *Meessia*), or as two veins (*Lichenovora*, *Obesoceras*, *Phereoeca*) or they may be missing (*Celestica*, *Ischnoscia*, *Lichenotinea*). The radiocubital cell in the hindwing is as a rule elongate and closed, at times open (*Lichenovora*, *Celestica*, *Lichenotinea*), seldom short and narrow (*Ischnoscia*). In some instances it includes the radial trunk (*Obesoceras*, *Meessia*).

Median spurs of hind tibiae on basal half more or less close to base.

For the genera of this subfamily only descriptions of the venation are given in the following pages; these data have either been spread in a number of separate publications or not described at all; the male genitalia, on the contrary, have been very well characterized by PETERSEN (1957—1964).

The male genitalia are characterized by more or less pronounced reduction of the uncus and gnathos, which in some instances can be missing altogether. Valvae developed, strongly specialized, sometimes asymmetrical (*Infurcitinea*). Vinculum strongly developed, very broad in some genera (*Lichenovora*, *Lichenotinea*) while in other it is narrow and has two tips (*Infurcitinea*), or a saccus of variable length and breadth (*Celestica*, *Agnathosia*, *Phereoeca*, *Montetinea*, *Meessia*, *Obesoceras*, *Gozmanytinea*, *Ischnoscia*, *Novotinea*). Aedeagus developed, usually with cornuti; in some genera the shape of aedeagus is very characteristic. Sometimes, e.g. in *Infurcitinea*, the anellus is strongly developed.

Since the female genitalia are known only in few members of this subfamily, it is not possible to characterize them at the present time.

The scanty data in the literature show that the larvae of the subfamily Meessiinae feed on lichens, and that the adults may be captured on rocks covered with lichens and at night at light.

The present subfamily includes the following genera: *Celestica* Meyrick, *Agnathosia* Amsel, *Phereoeca* Hinton & Bradley, *Montetinea* Petersen, *Meessia* Hofmann, *Obesoceras* Petersen, *Gozmanytinea* gen. nov., *Infurcitinea* Spuler, *Tineiforma* Amsel, *Lichenotinea* Petersen, *Ischnoscia* Meyrick, and *Novotinea* Amsel.

Celestica Meyrick, 1917

(Fig. 6—7)

Type-species, *Tinea angustipennis* H.-S., 1854.

Until now this genus stands isolated within the family Tineidae, showing affinities with some Meessiinae.

Wings very elongate and narrow. Sc of forewing terminating before middle of wing; radial veins all from the radiocubital cell. The distance between R_1 and R_2 about twelve times larger than that between R_2 and R_3 . The three median veins are present and well marked. Cubital trunk strong; cubital veins missing. One anal vein present, distinct throughout. Radiocubital cell very elongate, exceeding $2/3$ of wing length, very narrow basally.

Sc of hindwing terminating beyond marginal half of costa. Basal half of radial trunk not evident. R well marked. Two median veins present. Cubital trunk curved and close to anal edge of wing. Cu_1 and Cu_2 present, short. All anal veins missing.

Only one species.

Examined material. 1 ♂, Poland, Oswiecim, 30.VII.1960 (S. TOLL) (*C. angustipennis*).

Distribution. Yugoslavia (Macedonia), Rumania, Central Europe, Netherlands, Denmark, Finland, England.

Agnathosia Amsel, 1954

(Fig. 8—9)

Type-species: *Tinea mendicella* Hübner, 1796.

Vein Sc of forewing terminating on costa before middle. Radial trunk feebly marked. All five radial veins independently ending on costal edge of wing. Distance between bases of veins R_1 and R_2 about $3.5 \times$ as large as that between bases of veins R_2 and R_3 . Veins R_4 , R_5 , M_1 and M_2 weak along a short distance from base. Three median veins. Cubital trunk and two cubital veins well marked. A_1 feebly marked, not reaching edge of wing, A_2 strongly marked, reaching that edge; A_3 absent.

Costal edge of hindwing with a convexity; Sc terminating beyond half of wing. Radial trunk feebly marked and radial vein with a weak small portion from base, remaining part strong. Bases of M_1 and M_2 close together. Cubital trunk and cubital veins well marked. Only one anal vein apparent, but weak, reaching to edge of wing.

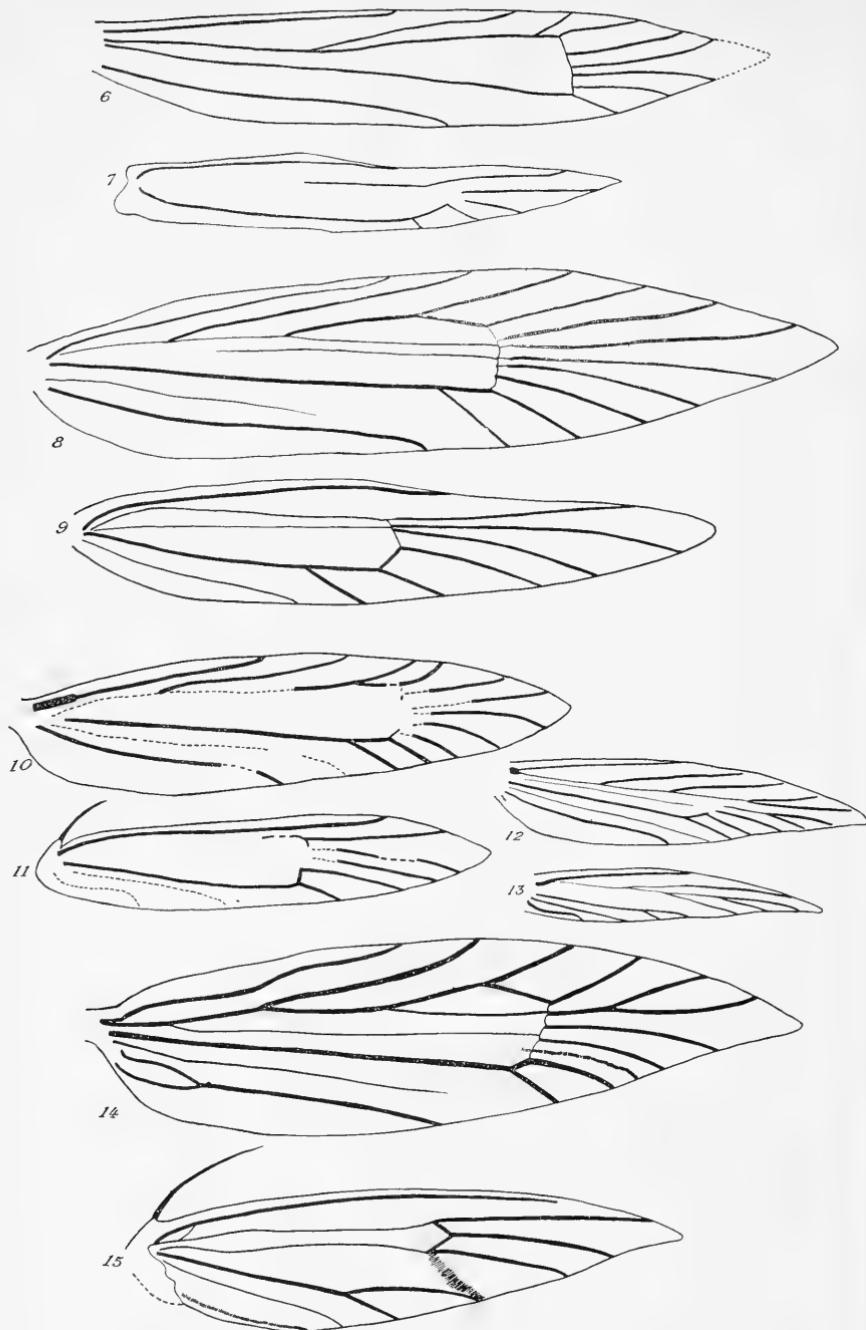


Fig. 6—15. Venation of Tineidae. 6—7, *Celestica angustipennis* (H.-S.); 8—9, *Agnathosia mendicella* (Hb.); 10—11, *Phereoeca uferella* (Wlsm.) (after Hinton & Bradley); 12—13, *Lichenovora rhenania* Pet.; 14—15, *Meessia vinculella* (H.-S.) (after Spuler)

Only one species.

Examined material. 1 ♂, Rumania, Suceava (I. TABACARU).

Distribution. Finland, Central Europe, and Rumania.

Phereoeca Hinton & Bradley, 1956
(Fig. 10—11)

Type-species, *Tineola uterella* Walsingham, 1897.

Vein Sc in forewing ending in middle of costal margin. Radial trunk feebly marked at $2/3$. All radial veins arise independently from radiocubital cell. Diverse portions of bases R_4 , R_5 , M_1 , M_2 and M_3 weak. A_1 ill-developed, A_2 weak in distal portion, A_3 absent.

Sc of hindwing very long, ending at $4/5$ of costa. Radial trunk absent. R distinct. M_1 and M_2 with a weak base.

The genus includes four species, *Ph. uterella* (Wlsm.), *Ph. allutella* (Rbl.), *Ph. pachyspila* (Meyrick), and *Ph. walsinghami* (Busck).

Distribution. Canaries, Madeira, Ceylon, India, West Indies, and Florida.

Lichenovora Petersen, 1957
(Fig. 12—13)

Type-species, *Lichenovora rhenania* Petersen, 1962 (*Lichenovora nigripunctella* Petersen, 1957, nec Haworth, 1828).

Two species belong to the genus, viz. *L. nigripunctella* (Hw.) and *L. rhenania* Pet.

Examined material, 1 ♂, *L. rhenania* Pet., Rumania, Bucuresti.

Distribution. England, Central Europe, Spain, Sicily, Yugoslavia (Dalmatia), Bulgaria, and Rumania.

Lichenovora rhenania Petersen, 1962

This species is hardly distinguishable externally from *L. nigripunctella* (Hw.).

Head light yellow. Antenna to $3/4$ of wing. First two antennal joints light yellow, flagellum yellowish-brown. First antennal joint $21/5$ times longer than broad; second joint $21/2$ times shorter than first. Galeae and maxillary palpi absent. Labial palpi developed, 3-jointed; last joint pointed, equal to $2/3$ of second. Pear-shaped sensorial papilla of last joint of labial palpi with 3 short hairs on surface.

Ground colour of forewing light yellow. Brown markings forming spots and bands situated as follows: one spot at costal margin, followed by three faint spots, one beneath the other, in the shape of an interrupted band; near middle of wing there is a band broadened medially and at the ends along wing edge; a similarly shaped band at $2/3$ from wing base, broader, followed by a small spot in the vicinity of costal margin; wing apex likewise brown. Cilia of forewing light yellow. Hindwing and cilia whitish-yellow. Forewing under side ochreous-yellow, hindwing much lighter.

Forewing with vein Sc ending on costal margin before middle of wing. Radial trunk and A_1 throughout, as well as bases of R_{3+4} and M_{1+2} , are less developed.

Radial veins to costa. R_3 and R_4 and M_1 and M_2 stalked. A_2 distinct throughout, reaching edge of wing. A_3 very short, hardly visible. Radiocubital cell $2/3$ of wing length, its distal end very faint. Hindwing with Sc to beyond half of costa. Radial trunk and bases of R, M_1+2 and M_3 hardly visible. Radiocubital cell open, median veins running from radial trunk. Cu_1 continuing as a distinct cubital trunk. Cu_2 short. A_1 reaching edge of wing; A_2 and A_3 parallel. Legs brown-yellow.

Examined material. 1 ♂, Rumania, Bucuresti, 27.VIII.1958 (author).

Distribution. Germany, Rumania.

In a previous paper (CAPUSE, 1963) I recorded *L. nigripunctella* (Hw.) as new for the Rumanian fauna, judging from PETERSEN's description (1957: 345) of the genitalia. It appeared to be *L. rhenania* Pet., described by the same author at the end of 1962, which description I received after the publication of my paper.

Meessia Hofmann, 1898

(Fig. 14—15)

Type-species, *Tinea vinculella* H.-S., 1850.

Forewing with vein Sc to before middle of costa. R_4 and R_5 stalked. M_3 absent. A_1 weak, not reaching edge. A_2 and A_3 free at base, then united.

Hindwing with Sc long. Radial trunk ill-defined throughout. Cell very narrow, with radial and median trunks. R, M_1 and M_2 well marked; M_3 absent. Cubital trunk strong, distally furcate. One single weak anal vein.

The following species have been assigned to *Meessia*: *M. vinculella* (H.-S.), ? *M. vinctella* (H.-S.), *M. pachyceras* Wlsm., *M. richardsoni* Wlsm., *M. klimeschi* Ams., *M. nerviella* Ams., *M. mensella* Wlsm., *M. leopoldella* (Cst.), *M. oberthurella* (Mill.), *M. nigraella* Mar., *M. alberti* Ams., *M. gallica* Pet., and the following new species.

Examined material. 1 ♀, *M. herculanella* spec. nov.

Distribution. Central Europe, England, Iberian Peninsula, France, Italy, Corsica, Sicily, and Rumania.

Meessia herculanella spec. nov.

(Fig. 16—18)

Holotype: 1 ♀, Rumania, Baile Herculane, Orsova district, Banat Region, 8.VII.1964 (author). GS. no. 956. In the author's collection.¹⁾

Head yellowish-white. Antennae ringed brown and yellowish-white; brown basal rings of joints narrower than yellowish-white apical ones.

Forewing black-brown with two broad white bands not reaching dorsum but exceeding half of wing breadth, from $1/3$ and $2/3$ of costa, respectively; anterior band narrowest. Fringes concolorous with ground colour, with white tips. Hindwing dark brown.

Female genitalia. Posterior ends of apophyses anteriores attached to a narrow, well sclerotized ring-shaped 9th segment; broader dorsally. This ring is open ventrally, as usual, interrupted by the colliculum. Ostium bursae large, continued

¹⁾ After the present paper was sent to press, I received through the kindness of Dr. F. KASY of the Vienna Museum, 5 ♂ and 1 ♀ from Baile Herculane, all belonging to this species.

by a well-sclerotized, relatively long colliculum. Beyond this the membranous ductus is strongly extended, then narrowed before bursa copulatrix. A dentate, sclerotized plate at the beginning of ductus bursae. Corpus bursae relatively small, oval, with an agglomeration of spinules in median portion dorsally.

M. herculanella resembles in external appearance *M. vinculella* (H.-S.) from which it differs by the darker ground colour, the lack of golden gloss and by less extended but more pronounced pattern. With the aid of genital characters *M. herculanella* is easily recognizable by the presence of signa, dentate sclerite, and spines of corpus bursae. The venation of the forewing resembles that in *M. vinculella* (H.-S.) (SPULER, 1910), only the stalk of R_4 and R_5 is much longer.

Obesoceras Petersen, 1957

(Fig. 19—28)

Type-species, *Tinea granulatella* H.-S., 1850.

Forewing with additional vein present, fused with Sc, ending before middle of costa. All radial veins present; R_2 and R_3 stalked. Base of R_4 usually close to base of R_5 . Sometimes M_1 from common stalk with R_5 (*O. confusellum orientale*, *O. hedemanni*). Sometimes one of the median veins absent (*O. granulatellum*, *O. hedemanni*). A_1 does not reach margin and is weak. United portion of A_2 and A_3 long; small portion of these veins free at base. Radiocubital cell narrow and long.

Hindwing with vein Sc to near middle of costa. Radial trunk weak, forming a very narrow long cell together with median trunk. R, M_1 and M_2 from end of cell. M_3 absent. Cubital trunk distally furcate; terminal portions of cubital veins weak. Two anal veins.

The genus includes the following species: *O. granulatellum* (H.-S.), *O. holtzi* (Rbl.), *O. confusellum* (H.-S.), *O. hedemanni* (Rbl.), *O. croaticum* Pet., *O. romanum* Pet., and *O. forsteri* Pet.

Examined material. 1 ♀, *O. granulatellum* (H.-S.); 1 ♂, *O. confusellum orientale* subsp. nov., and 1 ♂, *O. hedemanni* (Rbl.).

Distribution. Italy, Bavaria, Austria, Yugoslavia (Dalmatia, Macedonia), Albania, Greece, and Rumania.

Obesoceras granulatellum (Herrich-Schäffer, 1850)

(Fig. 19—20)

Head brown-yellow. Antennae brown-black. Forewing black-brown with yellowish-white costal spots at $1/3$ and $2/3$, respectively; towards dorsum each spot continued as two narrow bands. A small line and two yellowish-white spots in apical area. Hindwing dark brown.

Venation of forewing similar to that in *O. confusellum orientale* subsp. nov., from which it only differs by the lack of median vein and by distant bases of R_4 and R_5 .

Ostium bursae large, surrounding area weakly sclerotized. Ductus bursae narrow at base then strongly dilated. Bursa copulatrix elongate with ten sclerotized signa, shaped as slender dentate rods. Apophyses anteriores furcate, dorsal arm longer than ventral, and with two apical hairs.

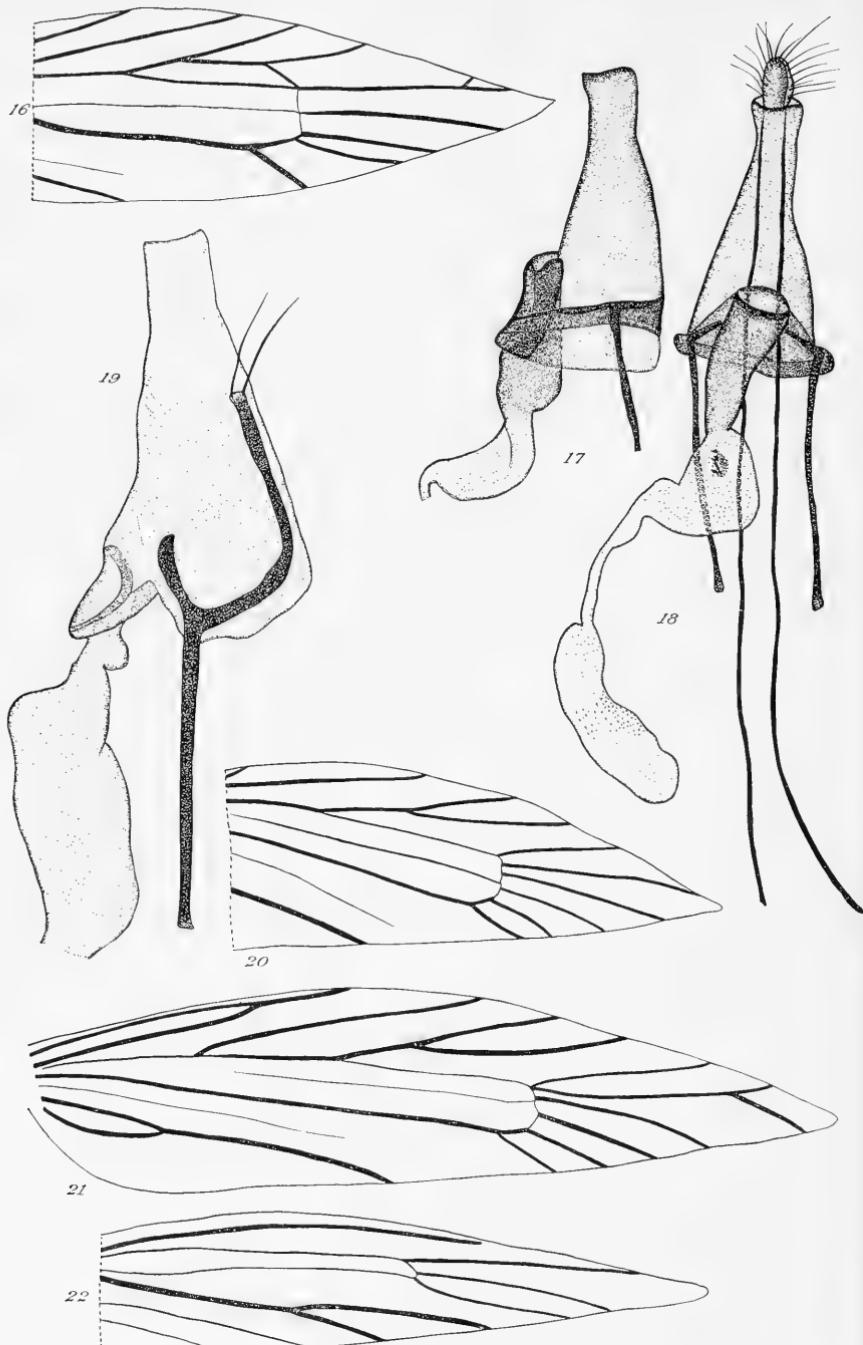


Fig. 16—18. *Meessia herculanella* sp. n., ♀ holotype. 16, venation in distal half of forewing; 17, lateral view of genitalia; 18, ventral view of the same. Fig. 19—20. *Obesoceras granulatellum* (H.-S.). 19, ♀ genitalia; 20, venation in distal half of forewing. Fig. 21—22. *Obesoceras confusellum orientale* ssp. n., ♂ holotype, venation

Examined material. 1 ♀, Rumania, Baile Herculane, Orsova district, Banat Region, 10.VII.1964 (author).

Distribution. Albania, Yugoslavia (Istria, Dalmatia, Montenegro, Macedonia), and Rumania.

***Obesoceras confusellum orientale* subsp. nov.**
(Fig. 21—26)

Holotype: ♂, Rumania, Baile Herculane — Mt. Domogled, Crucea Alba, Orsova district, Banat Region (author). GS. no. 955. In the author's collection.

Head yellowish-white; a few brown scales on frontal margin. First antennal joint brown-black, remaining joints yellowish-white with distal narrow brown rings. Labial palpi dirty white; 2nd and 3rd joints distally brown. Forewing with brown-black ground colour, markings, white bands and spots. Oblique transverse band from dorsum near base to half of wing breadth. Small square spot on $\frac{1}{4}$ of costa continued towards dorsum by three interrupted lines. On middle of costa small rectangular spot continued a little obliquely across wing; two interrupted lines from lateral angles of the spot. In the apical half of wing three narrow, transverse bands obliquely to base of wing. Hindwing blackish-brown.

After a long free portion, Sc of forewing anastomosing with additional vein to before middle of costa. Radial trunk weak, stronger only between bases of R_1 and stalk of R_{2+3} . R_1 approximately to middle of costa. R_5 and M_1 forming a long stalk, originating close to R_4 . R_5 terminates at costa about twice as far from apex as M_1 is at termen. M_2 and M_3 present. A_1 weak, not reaching dorsum. A_2 and A_3 well marked, free at base, their anastomose twice as long as free parts.

Legs brown with yellowish-white spurs and yellowish-white ringed tarsal joints.

Male genitalia. Tegumen + uncus broad with lateral edges turned inward. Top of uncus bilobed. Vinculum broad, with thick and relatively short saccus. Gnathos unpaired, with curved, dilated and short-spinose apex. Lateral lobes of tegumen short and relatively broad with much narrowed end. Cucullus narrowed, finger-shaped. A strong tooth near middle of ventral margin of valva; dorsal margin hardly concave in middle. Sacculus, a large conical prominence, the margin of which beset with numerous strong short spines. Aedeagus short and thick with a narrowed strongly sclerotized apical portion. One short, dentoid cornutus present.

Female unknown.

O. confusellum orientale subsp. nov. is very similar to *O. confusellum confusellum* (H.-S.); however, as the descriptions and drawings of PETERSEN show, there are some distinct differences. Thus externally *O. c. orientale* subsp. nov. differs from *O. c. confusellum* (H.-S.) by having two well-defined costal spots, continued to dorsum as two or three lines and having three stripes towards apex, instead of two indefinite median stripes and one apical spot. Moreover, the ground colour is darker in *O. confusellum orientale*. It is apparent from PETERSEN's key, descriptions, and drawings that in *O. confusellum* (H.-S.) the uncus is not bilobed, as in our subspecies. In *O. c. orientale* the dorsal margin of the valva is more straight while in *O. c. confusellum* it is concave. In the new subspecies the cornutus is situated in the narrowed portion of the aedeagus (in *O. c. confusellum*, in the distal end of the vesica).

Our subspecies fits in PETERSEN's key (1964b: 18—19) as follows:

1. — Posterior margin of the vinculum with a thick, sclerotized, distally pointed rod, about as long as aedeagus *O. granulatellum* (H.-S.)
- Posterior margin of the vinculum without a sclerotized rod 2
2. — Dorsal edge of the valva with three large crescent-shaped teeth. Aedeagus without cornutus *O. holtzi* (Rbl.)
- Dorsal edge of the valva without teeth. Aedeagus with cornutus 3
3. — Inner surface of the valvae with a large prominence in basal portion 4
- Valvae without prominence on inner surface 5
4. — Uncus with top not bilobed. Cornutus in distal end of vesica. Dorsal edge of valva with a slight concavity *O. confusellum confusellum* (H.-S.)
- Uncus with top bilobed. Cornutus in distal end of thickened portion of aedeagus. Dorsal margin of valva hardly concave *O. confusellum orientale* subsp. nov.
5. — Gnathos distally bilobed, valvae tapering, finger-like. Aedeagus short, about as long as valva 6
- Gnathos distally not bilobed, valvae dilated apically with sharp, arc-shaped teeth. Aedeagus slender, longer than valva 7
6. — Uncus with a faint median split. Valvae slightly rounded ventrally *O. hedemanni* (Rbl.)
- Uncus distally furcate; valvae nearly rectangular in basal part tapering towards tip, finger-like *O. forsteri* Pet.
7. — Ventral edge of valva with one strong and one weak dent. Aedeagus shorter than distance between uncus and end of saccus *O. romanum* Pet.
- Ventral edge of the valva with a large dent exceeding breadth of valva. Aedeagus as long as distance between uncus and tip of saccus *O. croaticum* Pet.

Obesoceras hedemanni (Rebel, 1899)

(Fig. 27—28)

The venation in this species is similar to that in *O. confusellum orientale* subsp. nov., from which it differs by a shorter stalk of R_5 and M_1 , by the distance between apex of wing and end of R_5 on costa being half the distance between wing apex and end of M_1 , as well as by the absence of a median vein.

Examined material. 1 ♂, southern Tyrol, Bozen (S. TOLL).

Distribution. Northern Italy.

Gozmanytinea gen. nov.

(Fig. 29—31)

Type-species, *Infurcitinea captans* Gozmany, 1960.

Vein Sc of forewing to before middle of costa. Radial trunk weak to base of R_1 . All radial veins to costa. R_1 and R_2 with ends curved towards base of wing; R_4 and R_5 stalked. M_2 and M_3 curved downwards. Cu_1 curved upwards. A_1 weak; its end on wing edge slightly better defined. A_1 and A_2 free at base. Hindwing

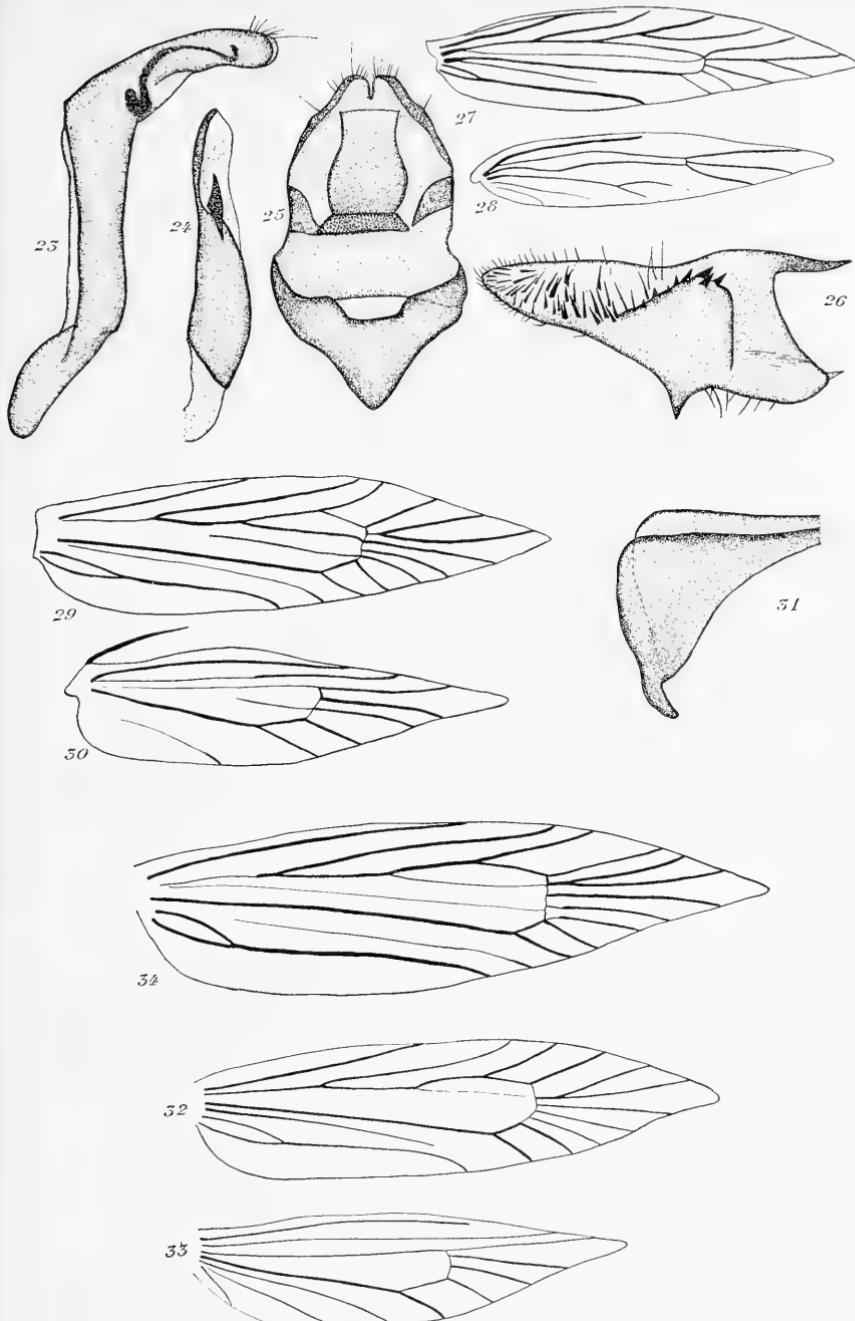


Fig. 23—26. *Obesoceras confusellum orientale* subsp. n., ♂ holotype. 23, lateral view of genitalia without aedeagus; 24, lateral view of aedeagus; 25, genitalia without aedeagus in ventral view; 26, inner surface of right valva. Fig. 27—28. *Obesoceras hedemanni* (Rbl.), venation. Fig. 29—31. *Gozmanytinea captans* (Gozm.), ♂ paratype. 29—30, venation; 31, vinculum, lateral view. Fig. 32—33. *Infurcitinea ignicella* (H.-S.), venation. Fig. 34. *Infurcitinea romanica* sp. n., ♀ allotype, venation of forewing

with costa rounded-prominent; Sc to beyond middle. R free from cell, its basal half weak. Median trunk weak. M_1 and M_2 curved downwards. Cubital veins relatively long. Cubital trunk strong. Only distal end of anal vein defined. Anal field broad.

The male genitalia are characterized by the symmetry of all the parts. Tegumen + uncus long, relatively narrow with lateral edges turned inwardly. Vinculum broad, with a single tip. Valvae basally broad, narrowing apically, narrowed portion with numerous basad directed hairs. Near the base of the costa there is a process which can be short (*G. banatica*), or long (*G. captans*) or furcate (*G. albanica*, *G. kasyi*, and *G. litochorella*). Aedeagus rather short, straight, with a small dilatation basally, broadened distally, usually with two small tips. Anellus cuff-shaped, membranous, with minute dentations, without sclerotized projections or hairy arms, as in *Infurcitinea* Spuler.

The female genitalia are known in a few members of the genus only (*G. captans* and *G. banatica*).

Gozmanytinea gen. nov. is very similar to *Infurcitinea* Spuler, having a similar venation. Our genus differs from the latter chiefly by the characters of the genitalia; in *Gozmanytinea* the genitalia are symmetrical, in *Infurcitinea*, asymmetrical; the vinculum in the new genus has a single tip, instead of two as in *Infurcitinea*; the anellus is in the shape of a membranous denticulate cuff, without projections, while in *Infurcitinea* this part bears projections or hairy arms.

Althought the venation is not differing from that in *Infurcitinea* and only slightly differing from that in *Lichenotinea*, I consider the group of species assigned to *Gozmanytinea* to represent a distinct unit showing a separate line of evolution, judging from the genital characters.

I have assigned the following species to *Gozmanytinea*: *G. captans* (Gozm.), *G. banatica* (Pet.), *G. albanica* (Pet.), *G. kasyi* (Pet.), and *G. litochorella* (Pet.).

Examined material. 1 ♂, *G. captans* (Gozm.) paratype¹); 1 ♂, 1 ♀, *G. banatica* (Pet.).

Distribution. Albania, Greece, Yugoslavia, Rumania, northern Tyrol, Engadine, Wallis, south-eastern France.

Gozmanytinea banatica (Petersen, 1961)
(Fig. 35—36a)

Head white, the base of antenna with light brown scales. First joint of antenna yellowish-white, basal joints of flagellum white, apical joints dark brown. Labial palpi white, second joint with a light brown diffuse ring. Maxillary palpi white. Thorax white with sparse maroonish scales. Ground colour of forewing yellowish-white, markings maroon-brown; points scattered over wing. Cilia white. Anterior legs brown with narrow white rings; middle and posterior legs maroon-white.

Female genitalia. Sternite VIII consisting of two plates, triangularly narrowed medially. Ostium bursae relatively broad, subrectangular with a notch in posterior margin. Ductus bursae long, narrow. Corpus bursae ovoid, constricted at the end

¹⁾ To the kindness of Dr. L. GOZMANY I owe material of this species received for study.

of ductus bursae. Apophyses anteriores rather long, with a strong spine at posterior end on internal margin. Apophyses posteriores long.

Examined material. 1 ♂, Rumania, Topolnita grotto at Ciresu, Turnu Severin district, Oltenia Region, 26.VI.1962 (V. DECU); 1 ♀, the same locality, 27.VI. 1964, GS. no. 953 (author). In the author's collection.

Distribution. Albania, Yugoslavia (Macedonia), and Rumania.

Infurcitinea Spuler, 1910
(Fig. 32—34, 37—43)

Type-species, *Tinea argentimaculella* Stainton, 1849.

Sc of forewing ending before or in middle of costa. Radial trunk weak basally. Radial veins terminating on costa. R_4 and R_5 short-stalked. Cubital trunk and two cubital veins well-defined throughout. A_1 does or does not reach wing edge (*I. ignicomella*); sometimes its terminal portion more defined than remaining portion (*I. romanica* spec. nov.). A_2 and A_3 with a short free portion, then united.

Sc of hindwing long, to middle of costa. The radial trunk free of cell. The radial trunk and R weak. Three median veins present. Median trunk and M_1 weak. M_1 to costa twice as near to apex as distance of end of M_2 to apex. Cubital trunk well-defined. The three anal veins weak.

Infurcitinea Spuler includes about 40 species.

Examined material. Rumania, 1 ♂, *I. ignicomella* (H.-S.), Bucuresti, 28.VI. 1962 (author); 1 ♂, *I. rumelicella* (Rbl.), Baile Herculane, 8.VII.1964 (author); 1 ♂, *I. albicomella* (H.-S.), Ineu, Arad district, Banat Region (L. DISZEGHY); Greece, 1 ♂, *I. olympica* Pet., Mt. Olympus (G. PETERSEN coll.¹), leg. F. KASY). Rumania, 1 ♂, 2 ♀, *I. romanica* spec. nov., Ciresu, Turnu Severin district, Oltenia Region (V. DECU).

Distribution. England, Iberian Peninsula, southern France, Central Europe, Italy, Corsica, Sardinia, Yugoslavia, Greece, Bulgaria, Rumania, USSR (Caucasus), Iran, Pakistan, Afghanistan, Palestine, Tunisia, Algeria, Morocco.

Infurcitinea romanica spec. nov.
(Fig. 34, 37—40)

The material has been collected in Topolnita grotto at Ciresu, Turnu Severin district, Oltenia Region, and is preserved in the author's collection. Holotype, ♂, 26.VI.1962 (V. DECU), GS. no. 893; allotype, ♀, 27.VI.1964, GS. no. 954; paratype, 1 ♀, 27.VI.1964 (author).

Head white. First antennal joint yellowish-white with scarce brown scales. Joints of flagellum blackish-brown, with narrow, white basal rings. Labial palpi blackish-brown basally, yellowish-white apically; their outer surface blackish-brown, inner surface white. First two joints of maxillary palpi black-brown, remainder white, densely mixed with brown. Thorax and tegulae white mixed with scarce black-brown scales. Ground colour of the forewing white, markings black-brown scat-

¹) I owe the loan of the material of this species to the kindness of Dr. G. PETERSEN.

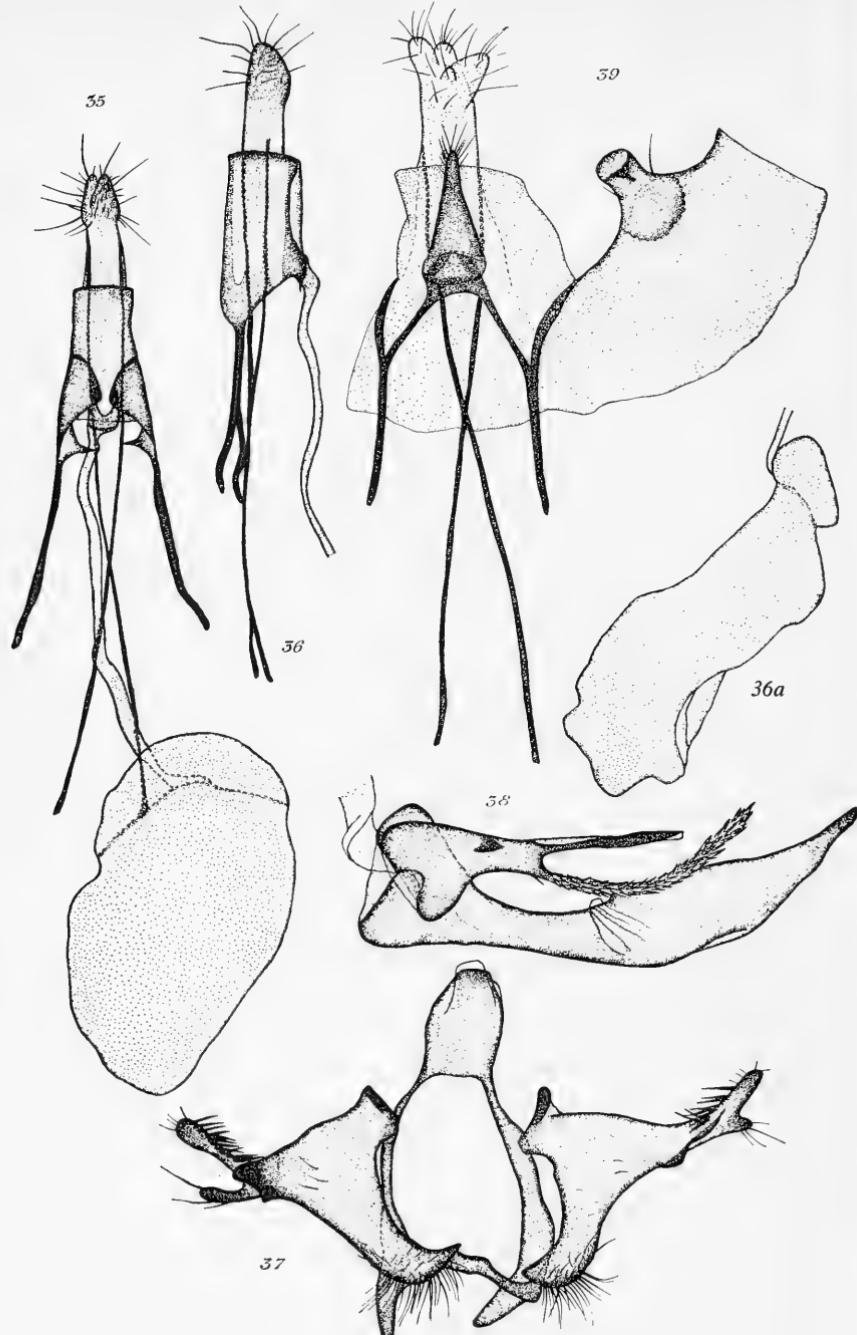


Fig. 35—36a. *Gozmanytinea banatica* (Pet.), ♀ genitalia. 35, ventral view; 36—36a, lateral view. Fig. 37—39. *Infurcitinea romanica* sp. n. 37, ♂ holotype, genitalia without aedeagus and anellus; 38, the same, aedeagus and anellus; 39, ♀ allotype, dorsal and ventral views of the genitalia

tered points. Fringes white. Venation as in the genus. Hindwing brown-grey; fringes dirty white.

Male genitalia. Tegumen + uncus relatively broad, slightly narrowing towards end. Vinculum narrow with two rather long processes. Valvae very broad at base, strongly narrowed towards apex, asymmetrical. Left valva with two rather long, slender, club-like arms, ventral somewhat shorter, dorsal with strong, rigid hairs. Bases of these arms with oblique, transverse, sclerotized ridges with distal edges slightly concave. Right valva more abruptly narrowed with short apical processes; dorsal margin of narrowed portion with strong rigid hairs; internal surface at the narrow part with a bilobed ridge, longer than in left valva, obliquely longitudinal. Bases of valvae ventrally covered with dense hairs. Anellus shaped as a plate with a strong constriction beyond a broad base; it is dilated again from middle, tapering apically. Aedeagus slender and narrow, strongly dilated at base, divided before middle in a straight, pointed arm and a curved, longer arm, covered with dense broad spines.

Female genitalia. Eighth segment ventrally with a sclerotized tube, dilated distally, upon which lays the ostium; dorsally with a sclerotized triangular body haired apically. Apophyses anteriores rather short with furcate posterior parts, arms dorsally united. Apophyses posteriores long. Anal papillae haired.

I. romanica spec. nov. resembles *I. olympica* Pet. but differs both externally and internally. In the former the first antennal joint is yellowish-white, in the latter brown-white. The labial palpi in *romanica* are black-brown externally, in *olympica* only the base of the third joint is brown. The black-brown dots of the forewing are more numerous in *olympica* than in *romanica*.

Infurcinea olympica Petersen, 1959
(Fig. 41—43)

Male genitalia. Tegumen + uncus relatively broad, distally rounded. Vinculum narrow with two rather long thick tips. Left valva with rather short apical process more dentate along ventral edge. Right valva relatively broad in constricted portion, with rather thick processes. The anellus tapers abruptly beyond middle into a long, strong well-sclerotized, curved spine. Both arms of the aedeagus of equal length, running parallel; one arm is provided with sparse spines. Lamella of the right valva transverse.

The shape and position of the lamellae of the valvae and the remaining genital characters are entirely different in *I. olympica* and in *I. romanica* (for comparison see above).

Examined material. 1 ♂, Greece, Mt. Olympus (G. PETERSEN coll., leg. F. KASY, GS. no. 1169). In the author's collection.

Lichenotinea Petersen, 1957
(Fig. 44—45)

Type-species, *Tinea pustulatella* Zeller, 1852.

Vein Sc of forewing to beyond middle of costa. Basal portion of radial trunk weak. Radial veins ending on costa; R_4 and R_5 stalked. Three median and two

cubital veins. A_1 weak throughout, reaching edge. A_2 and A_3 free at base then forming a long common trunk.

Sc of hindwing to beyond middle of costa; radiocubital cell open. Radial trunk weak throughout. Three median veins. M_1 and M_2 close at base. Cubital trunk well-marked, with two cubital veins. All anal veins absent.

Two species belong in *Lichenotinea* Pet., viz. *L. pustulatella* (Zll.) and *L. maculata* Pet.

Examined material. 3 ♂, Rumania, cave no. 2, Motru Sec at Calugareni, Gorj district, Oltenia Region, 16.VII.1961 (A. BALACESCU); 9 ♂ and 2 ♀, Topolnita cave at Ciresu, Turnu Severin district, Oltenia Region, 27.VI.1964 (author) (*L. pustulatella*).

Distribution. Central and southeastern Europe, Asia Minor.

Ischnoscia Meyrick, 1895
(Fig. 46—47)

Type-species, *Guenea borreonella* Miliere, 1874.

Sc of the forewing to before middle of costa. Radial trunk weak throughout. R_2 and R_3 long-stalked; R_4 and R_5 short-stalked. Free portion of R_4 short, not reaching edge. Stalk of $R_4 + R_5$ and a small basal portion of the two existing median veins weak. Cubital trunk well-defined, with two cubital veins. A_1 reaching edge but weak; A_2 well-defined; A_3 absent. Radiocubital cell narrowed and long.

Sc of the hindwing to beyond middle of costa. Radial trunk weak, but R well-defined. Two median veins. Cubital trunk well-marked, distally with two cubital veins. There is no cell proper but a weak vein from base of cubital trunk to the radial trunk towards its end, outlining a rudimentary cell.

The genus has two species, *I. borreonella* (Mill.) and *I. pandorella* (Mill.).

Examined material. Rumania, 1 ♂, 29.VIII.1964, cave beyond Cîrșa — Carasova community, Anina district, Banat Region (St. NEGREA) (*I. borreonella*).

Distribution. England, North Spain, France, southwestern Germany, Rumania.

Novotinea Amsel, 1938
(Fig. 48—49)

Type-species, *Tinea muricolella* Fuchs, 1879.

Sc of the forewing very short, ending before $1/3$ of costa. Four radial veins present. Radial trunk furcate into two radial veins. Other two radial veins free. Radiocubital cell open. Two median veins. Two cubital and one median vein from cubital trunk. One short anal vein.

Sc and cubital veins of the hindwing absent. Radial trunk together with the cubital trunk forming a very narrow and rather short cell. R stalked with one of the two median veins present. Two anal veins present, of which one very short.

Six species belong to the present genus, viz. *N. muricolella* (Fuchs), *N. carbonifera* (Wlsm.), *N. liguriella* (Ams.), *N. klimeschi* (Rbl.), *N. fasciata* (Stgr.), and *N. andalusiella* Pet.

Distribution. Western Germany, Spain, Corsica, Sardinia, Italy, Yugoslavia (southern Dalmatia), and Asia Minor.

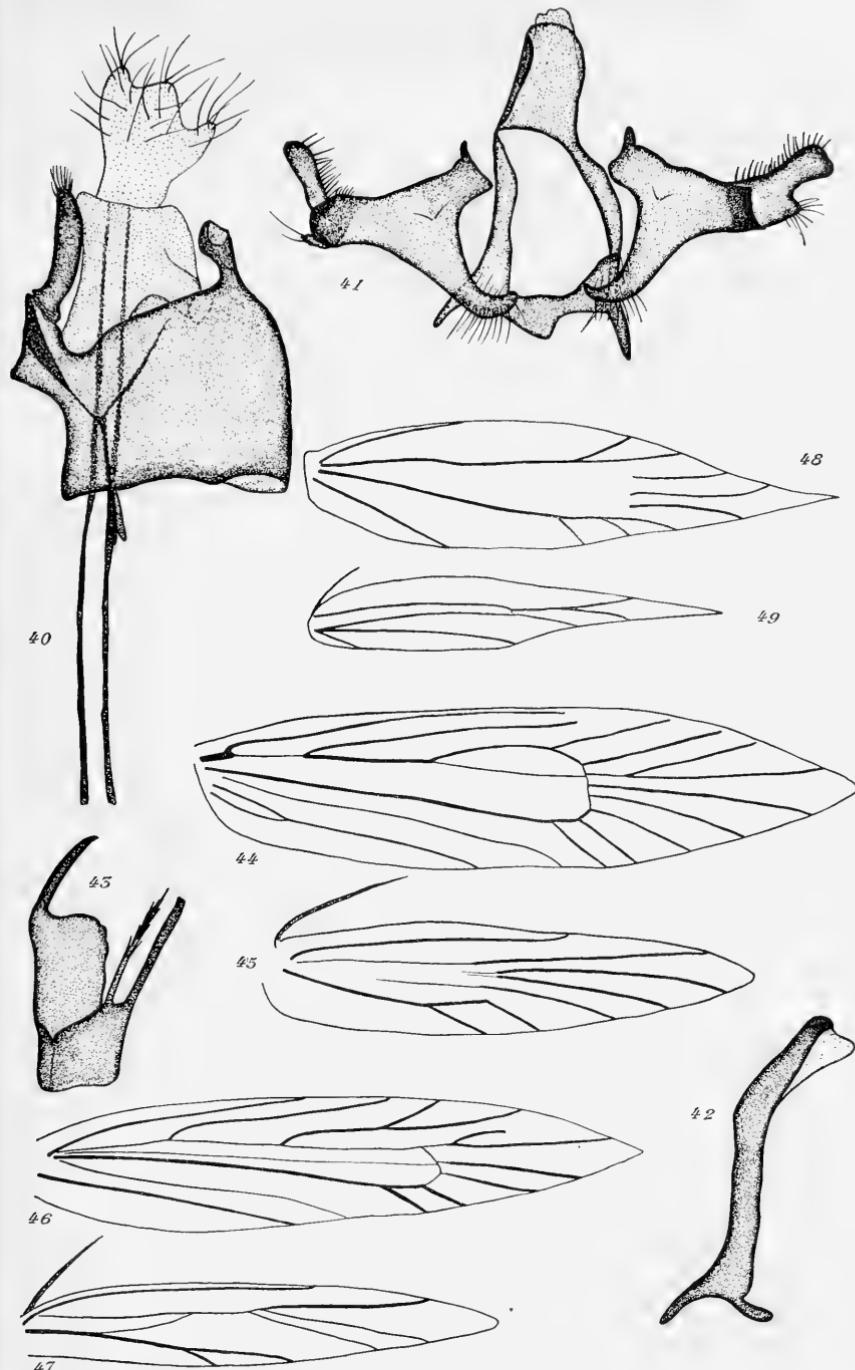


Fig. 40. *Infurcitinea romanica* sp. n., ♀ allotype, lateral view of genitalia. Fig. 41—43. *Infurcitinea olympica* Pet. 41, ♂ genitalia without aedeagus and anellus; 43, the same in lateral view; 42, the same, aedeagus and anellus. Fig. 44—45. *Lichenotinea pustulatella* (Zll.), venation. Fig. 46—47. *Ischnoscia borreonella* (Mill.), venation. Fig. 48—49. *Novotinea muricolella* (Fuchs), venation (after Amsel)

KEY TO THE GENERA OF MEESSIINAE ACCORDING TO VENATION 1)

1. — Hindwing with Sc present 2
 - Hindwing with Sc, one median vein, cubital veins and one anal vein absent. Forewing with Sc very short; one radial vein, one cubital vein and two anal veins absent *Novotinea* Ams.
2. — Forewing with Sc normally shaped 3
 - Forewing with Sc distally fused with an additional vein, both free at base *Obesoceras* Pet.
3. — Forewing with cubital veins present 4
 - Forewing with cubital veins absent. In hindwing cell open; base of radial trunk not distinct; two median veins present, all anal veins absent *Celestica* Meyr.
4. — Forewing with five radial veins 5
 - Forewing with four radial veins; M_1 and M_2 stalked; A_1 weak, A_2 very short. One anal vein absent in hindwing *Lichenovora* Pet.
5. — Forewing with all radial veins free 6
 - Forewing with some of the radial veins stalked 7
6. — Hindwing with two weak anal veins *Phereoeca* Hint. & Brad.
 - Hindwing with one weak anal vein *Agnathosia* Ams.
7. — Forewing with R_2 and R_3 , as well as R_4 and R_5 , stalked; R_4 short, not reaching margin; one median and one anal veins absent. All anal veins and one median vein absent in hindwing *Ischnoscia* Meyr.
 - Only R_4 and R_5 stalked 8
8. — Hindwing with cell closed, the radial or the cubital trunk does not participate in building of the cell; not all anal veins absent 9
 - Hindwing with cell open; all anal veins absent *Lichenotinea* Pet.
9. — Radial trunk does not participate in building of the cell in hindwing 10
 - Cubital trunk does not participate in building of the cell in hindwing *Meessia* Hofm.
10. — Forewing with A_1 weak, not reaching margin. All anal veins present in hindwing *Infurcitinea* Spul.
 - Forewing with A_1 weak, reaching margin. Two anal veins absent in hindwing *Gozmanytinea* gen. nov.

KEY TO THE GENERA OF MEESSIINAE, ACCORDING TO THE MALE GENITALIA

1. — Gnathos present 2
 - Gnathos absent 5
2. — Gnathos consisting of two arms 3
 - Gnathos not paired 4
3. — Arms of gnathos without base, distally joined, saccus dilated *Montetinea* Pet.
 - Arms of gnathos on a distinct base, distally not joined; saccus not dilated *Phereoeca* Hint. & Brad.

¹⁾ The genera *Montetinea* Pet. and *Tineiforma* Ams. are not included in the present key as their venation is unknown to me.

4. — Uncus ending in two lobes; hardly ending in a rounded-clavate lobe when a prominence on internal surface of the valva is present; saccus short *Obesoceras* Pet.
 — Uncus always ending in a single tip, usually acute, scarcely rounded; saccus long *Meessia* Hofm.

5. — Vinculum very broad, aedeagus short; saccus absent 6
 — Vinculum not so broad, aedeagus long; saccus present 7

6. — Uncus not distinct; valvae complete, basally dilated; anellus simple *Lichenovora* Pet.
 — Uncus distinct, acute; valvae deeply divided into two portions; anellus complicated *Lichenotinea* Pet.

7. — Uncus consisting of two bases, with strong, long hairs *Celestica* Meyr.
 — Uncus consisting either of a plate or of two lobes 8

8. — Uncus consisting of two lobes 9
 — Uncus consisting of a plate 10

9. — Tegumen narrow; valva with a ventral long, strong arm; aedeagus with an external very strong cornutus *Ischnoscia* Meyr.
 — Tegumen broad; valva without a ventral arm, sometimes with a small prominence; aedeagus with internal cornuti *Novotinea* Ams.

10. — Vinculum broad with a long saccus; aedeagus simple, slender, long; anellus roughly horseshoe-shaped *Agnathosia* Ams.
 — Vinculum narrow with a simple or double tip; aedeagus complicated, short; anellus of diverse shape, usually very complicated 11

11. — Anellus very complicated and developed; valvae asymmetrical; vinculum with two tips *Infurcitinea* Spul.¹⁾
 — Anellus cuff-shaped, weakly developed; valvae symmetrical; vinculum with one tip *Gozmanytinea* gen. nov.

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¹⁾ Here belongs probably also *Tineiforma* Ams.

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M. A. LIEFTINCK. — Notes on some Anthophorine bees, mainly from the Old World (Apoidea), p. 125—161, Fig. 1—92.

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NOTES ON SOME ANTHOPHORINE BEES, MAINLY FROM THE OLD WORLD (APOIDEA)

BY

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Rijksmuseum van Natuurlijke Historie, Leiden

Abstract

An outline is given of the present state of our knowledge of the tribe Anthophorini. This is followed by a discussion of the status, interrelationship and distribution of some Old and New World components of the *Habropoda* association. The essential features of the type-species of *Anthophora*, *Emphoropsis*, *Habropoda* and *Elaphropoda* are enumerated and, to ensure generic and specific recognition, illustrations of the more important male characters are supplied for each of these. A review of the Old World members of *Habropoda* includes *Anthophora oraniensis* Lep., from Algeria, which is redescribed and figured. Species doubtfully referred to *Habropoda* are listed, but it is emphasized that this taxon can be split up in a number of distinct genera with broadly overlapping ranges. One of these is *Elaphropoda*, a new genus from Eurasia, which contains several already described and one new species, *E. bembidion* sp. n., from Borneo.

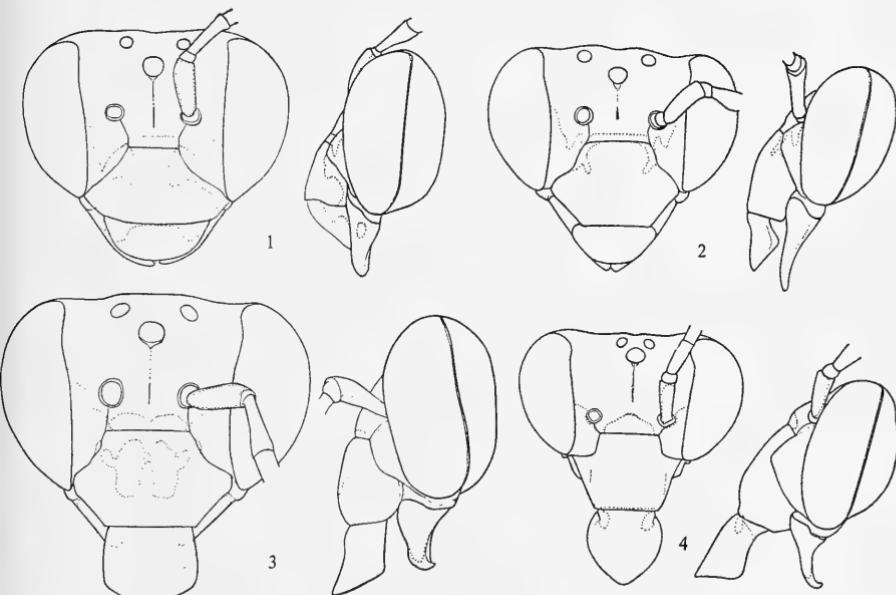


Fig. 1—4. Head in fronto-dorsal and lateral view. Fig. 1, *Anthophora acervorum* (L.), Holland; fig. 2, *Emphoropsis laboriosa* (F.), Florida; fig. 3, *Habropoda tarsata* (Spin.), Rome, Italy; fig. 4, *Elaphropoda impatiens* (Lieft.), Bukit Kuntu, Malaya. Light coloured and dark areas enclosed in dotted lines. Males

Introduction

The Anthophoridae are a large group of solitary bees having an almost world-wide distribution, a great many of which also occur in the tropical parts of the Old World. As far as the elements of the tribe Anthophorini are concerned, those of the Ethiopian and Malagasy faunal regions are still imperfectly analysed and will not concern us here: in addition to some others also found elsewhere, two genera, *Pachymelus* F. Smith, 1879, and *Pachymelopsis* Ckll., 1905, are richly

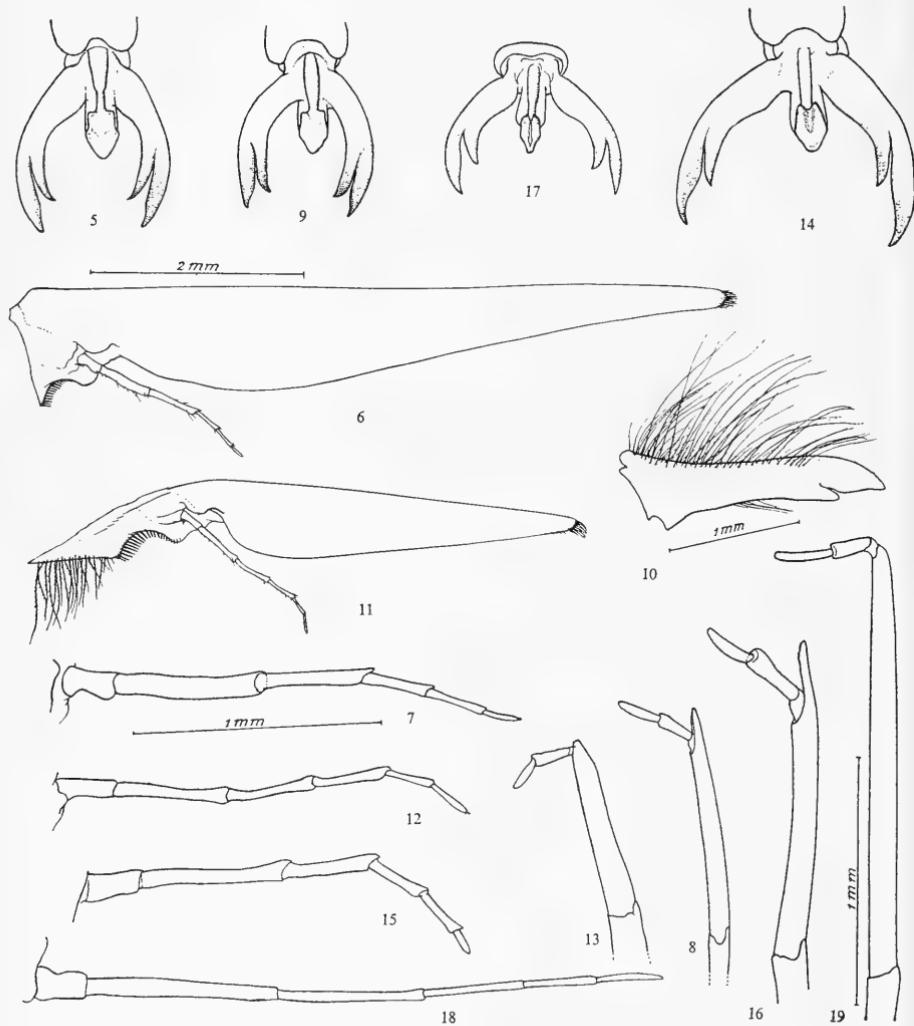


Fig. 5—19. Tarsal claws of hind leg, mandible, maxillae and maxillary palpi, and apical segments of labial palpi. Vestiture omitted. Fig. 5—8, *Anthophora acervorum* (L.), Holland; fig. 9—13, *Emphoropsis laboriosa* (F.), Florida; fig. 14—16, *Habropoda tarsata* (Spin.), Rome, Italy; fig. 17, *Elaphropoda impatiens* (Lieft.), Fraser's Hill, Malaya; fig. 18—19, *Elaphropoda percarinata* (Ckll.), Fukien, China. Corresponding figures drawn to the same scale. Males

represented in Madagascar and apparently peculiar to that island. In Eurasia and Australia, on the other hand, six non-parasitic genera of the tribe have so far been recognized. These are: *Anthophora* Latr., 1803 (including the poorly defined *Paramegilla* Friese), *Heliophila* Klug, 1807, *Habropoda* F. Smith, 1854, *Clisodon* Patton, 1879, *Amegilla* Friese, 1897, and *Asaropoda* Cockerell, 1926. In the present paper only *Habropoda* and a new taxon closely related to it will be discussed in somewhat greater detail.

The genera *Anthophora*, *Heliophila* and *Clisodon*¹⁾, having mainly a Palearctic and Mediterranean distribution in the Old World, are not or only poorly

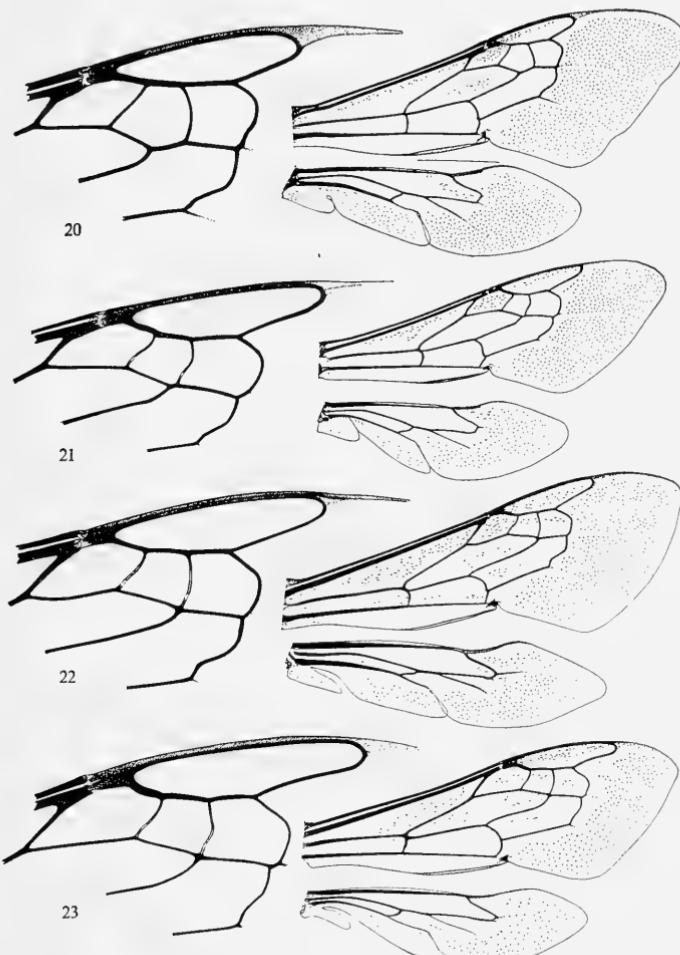


Fig. 20—23. Venation of right pair of wings (right) and portion of fore wings, more enlarged. Fig. 20, *Anthophora acervorum* (L.), Holland; fig. 21, *Emphoropsis laboriosa* (F.), Florida; fig. 22, *Habropoda tarsata* (Spin.), Rome, Italy; fig. 23, *Elaphropoda impatiens* (Lieft.), Bukit Kutu, Malaya. Corresponding figures drawn to the same scale. Males

¹⁾ Revision: V. B. POPOV (1951).

represented in southeast Asia and are absent from Australia. *Amegilla*, with its numerous species throughout the warmer parts of the Eastern Hemisphere, is also the dominant genus in southeast Asia and the Australian region. It was briefly reviewed by POPOV (1950), who was the first to firmly establish its status within the family, supplying at the same time a list of the described species and lower categories compiled from the literature then available to him. Towards the eastern periphery of the Oriental region and on the mainland of Australia *Amegilla* mixes with species of the nearly related *Asaropoda*, which has its centre of distribution in Australia. A synopsis of the Australian forms was published by RAYMENT (1951), whose treatment is, however, superficial and does not include any of the taxa defined by earlier writers. Lastly, the origin and geographical distribution of the Eurasian genus *Habropoda* were discussed at some length by POPOV (1948), whose paper clearly demonstrates the complexity of this group. In this synoptic review the author outlined the supposed evolutionary history of these bees, referring simultaneously to some taxonomic features. It was necessarily based on a study of the genus in its broadest sense, as it comprised all described Old World forms previously assigned to it. Although many of the latter were known to him only from the literature, all recorded localities were treated alike and entered in a map showing the distribution regardless of group differentiations. POPOV's concept of *Habropoda* not only necessitated the inclusion of at least one African element of rather remote affinity but also of other units with which he was not personally acquainted. As a matter of fact, three Eurasian genera with overlapping ranges are involved in POPOV's account. Two of them are treated in the present paper, while a third (and probably more) still require careful analysis. Moreover, these taxa are morphologically as closely related among themselves as each of them can be linked with the dominant genus *Anthophora*, which is itself highly polymorphic and of widespread occurrence. For some unknown reason the last-mentioned genus was entirely left out of consideration in POPOV's account. We have at present obtained a somewhat better knowledge of the morphology of these bees and, though still far from complete, it indicates that POPOV's interpretation of the present-day distribution of the *Habropoda* group requires considerable alteration. I also think that the conclusions arrived at by him, though admittedly tentative, are rather premature and do not permit of a decisive answer to be given on the origin and evolution of these bees.

In a publication that appeared four years in advance of POPOV's review but which for obvious reasons had remained unknown to him, I have given characterizations of a number of old and new species of "*Anthophora*" and "*Habropoda*" occurring in the Malaysian subregion (LIEFTINCK, 1944). All regional species previously assigned by me to *Anthophora* were subsequently transferred to *Amegilla* (LIEFTINCK, 1956) but, in anticipation of a thorough analysis of the whole complex still amalgamated in *Anthophora*, I merely stated that a new genus would be necessary to accommodate the tropical oriental bees formerly included in *Habropoda*.

It is the object of the present paper to demonstrate the principal features of this compact little group, which is here introduced under the new name *Elaphropoda*, gen. nov. An attempt will be made to directly compare the type-species and allied

forms of this taxon with others of more remote affinity and with the types of three other genera considered to be most nearly related. These representative species are: *Anthophora acervorum* (L., 1758), *Emphoropsis lebriosa* (F., 1804), and *Habropoda tarsata* (Spinola, 1838) with its immediate allies.

The principal generic characters of *Anthophora* are contained in the well-known publication of MICHENER (1944), while definitions of *Emphoropsis* have been supplied by a number of writers whose publications are cited under that genus.

The illustrations of morphological structures accompanying the text of the following account are intended to be self-explanatory. As far as the genera *Anthophora* and *Emphoropsis* are concerned, the figures are given solely for the purpose of comparison with corresponding structures found in *Habropoda* and *Elaphropoda*, more comprehensive notes and descriptions, where necessary, being supplied only for the latter.

Anthophora Latreille, 1803

As is well known, *Anthophora* contains an enormous number of very diverse species distributed all over the temperate and subtropical parts of the world, with radiations in more southerly directions. There is, in fact, a marked decrease in the number of species south of the Tropic of Cancer; and when leaving aside the Anthophorini of the African fauna and South America, whose components and affinities are still imperfectly studied, it can be said that in the Old World tropics no true *Anthophora* occur in the Malay Archipelago nor has any been found in the Australian Region or the Pacific islands. The greatest diversity in morphological features exists amongst those inhabiting the temperate regions of the Old World from which it may possibly be inferred that the Nearctic elements are derived from old stock centred in the Palearctic Region.

In the existing keys and descriptions of these Old World *Anthophora*, group characters that may express the probable relationships have only rarely been taken into account¹⁾. Of the great majority of Mediterranean and Asiatic species, for instance, practically no descriptions or figures exist of the head and leg structures or of the male copulatory organs, so that many remain unrecognizable. In several instances it is not even known whether such forms are true *Anthophora* or *Amegilla*. Some of the former are superficially much like *Amegilla* while others may easily be mistaken for *Helophilus*, which themselves are sometimes astoundingly similar to certain *Amegilla* with which they occur together. The highly specialized short-haired and banded groups of true *Anthophora* are thus frequently confused with similarly-looking sections of allied genera. With so many of them only known from descriptions, it is hardly surprising that generic identification can only be a matter of guess-work. A notable exception to the rule forms the beautifully

¹⁾ A section still of doubtful generic (or subgeneric) status is the "subgenus" *Paramegilla* Friese, 1897. According to FRIESE, the only character by which it is said to differ from *Anthophora* is the presence of large, white pubescent spots at the sides of the abdominal segments. The type-species of *Paramegilla* is *Apis ireos* Pallas, 1773, from Russia; I have only seen a female of another included species, *A. (P.) christofi* F. Mor., 1880, from Turkestan.

illustrated work of MORAWITZ (1875) on the bees of Turkestan. In this outstanding publication a number of excellent drawings of male genitalia are found which are most helpful in segregating the regional genera and species groups.

The most comprehensive study of *Anthophora* is the one published by MICHENNER (1944), who provided a profusely illustrated account of the general morphology and anatomy based on one of the commonest Nearctic species, viz. *A. edwardsii* Cresson. For comparison with other genera discussed in the present paper I have, for similar reasons, selected one of the best known European representatives,

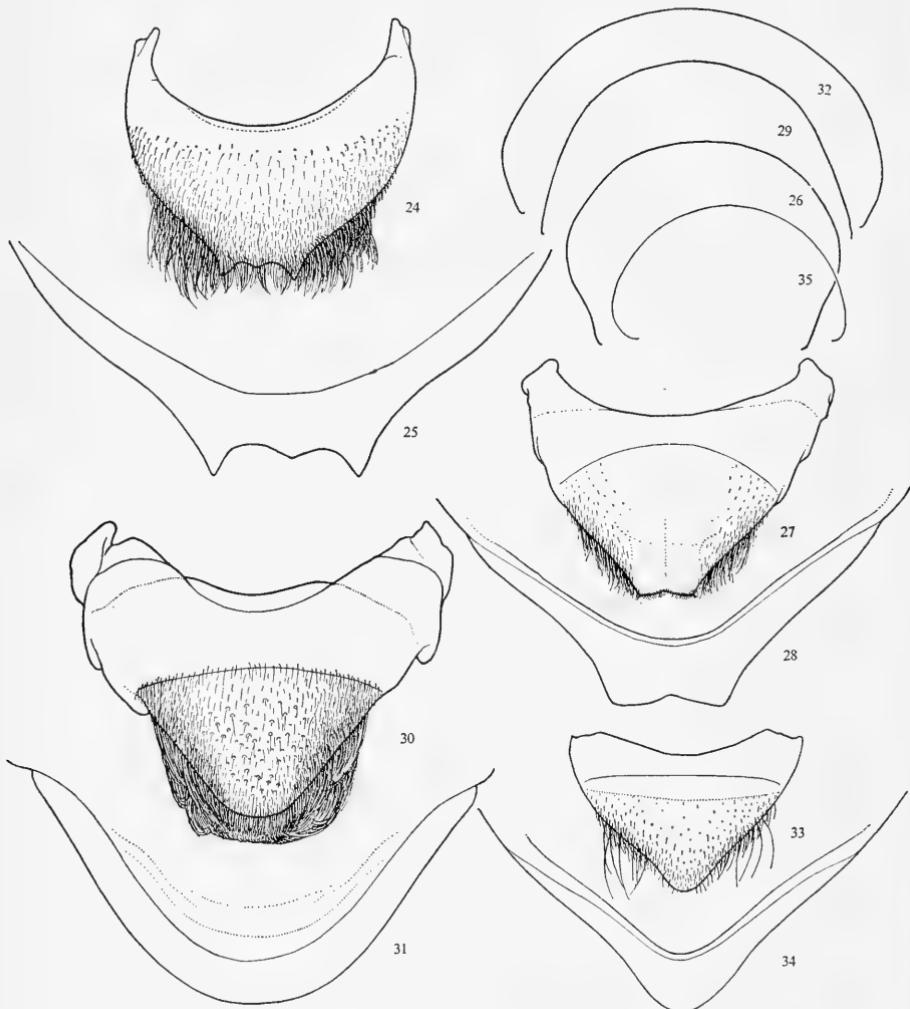


Fig. 24—35. Seventh gastral tergite of male, dorsal view (24, 27, 30 and 33), ventral view more enlarged (25, 28, 31 and 34), and cross-sections of same (26, 29, 32 and 35). Fig. 24—26, *Anthophora acervorum* (L.), Holland; fig. 27—29, *Emphoropsis laboriosa* (F.), Florida; fig. 30—32, *Habropoda tarsata* (Spin.), Rome, Italy; fig. 33—35, *Elaphropoda impatiens* (Lieft.), Fraser's Hill, Malaya. Corresponding figures drawn to the same scale

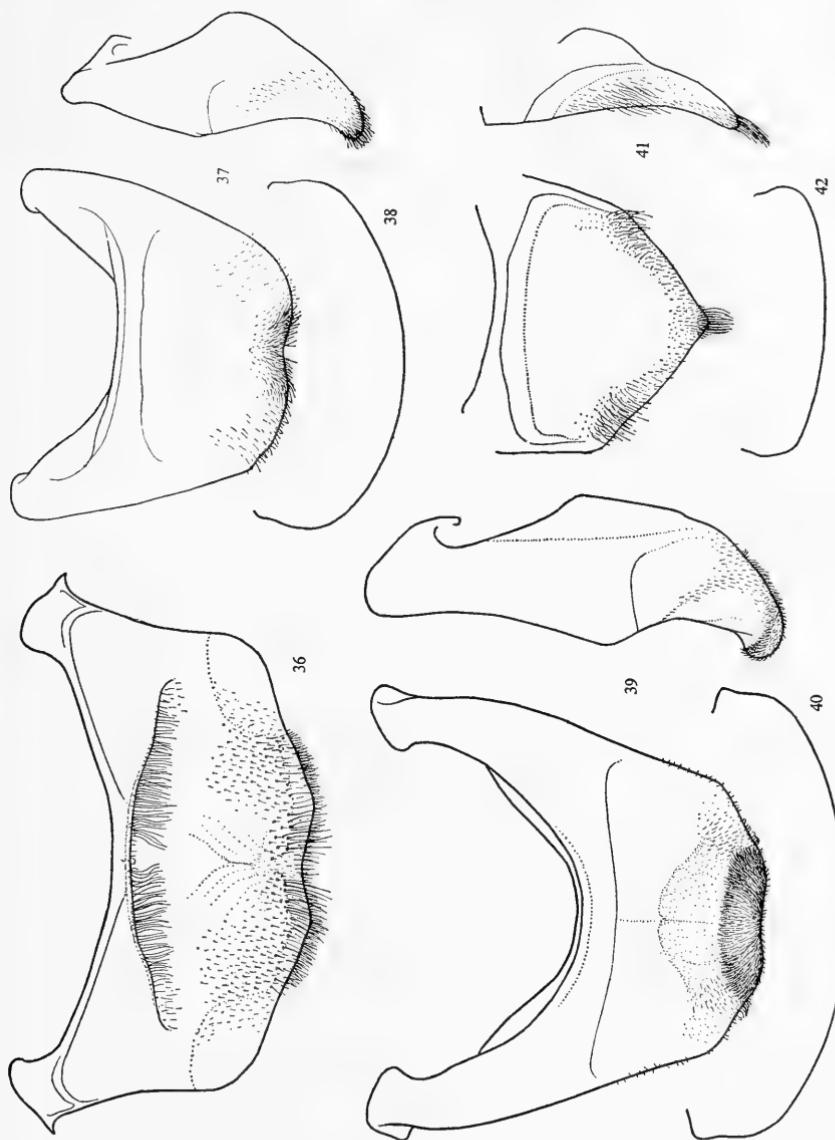
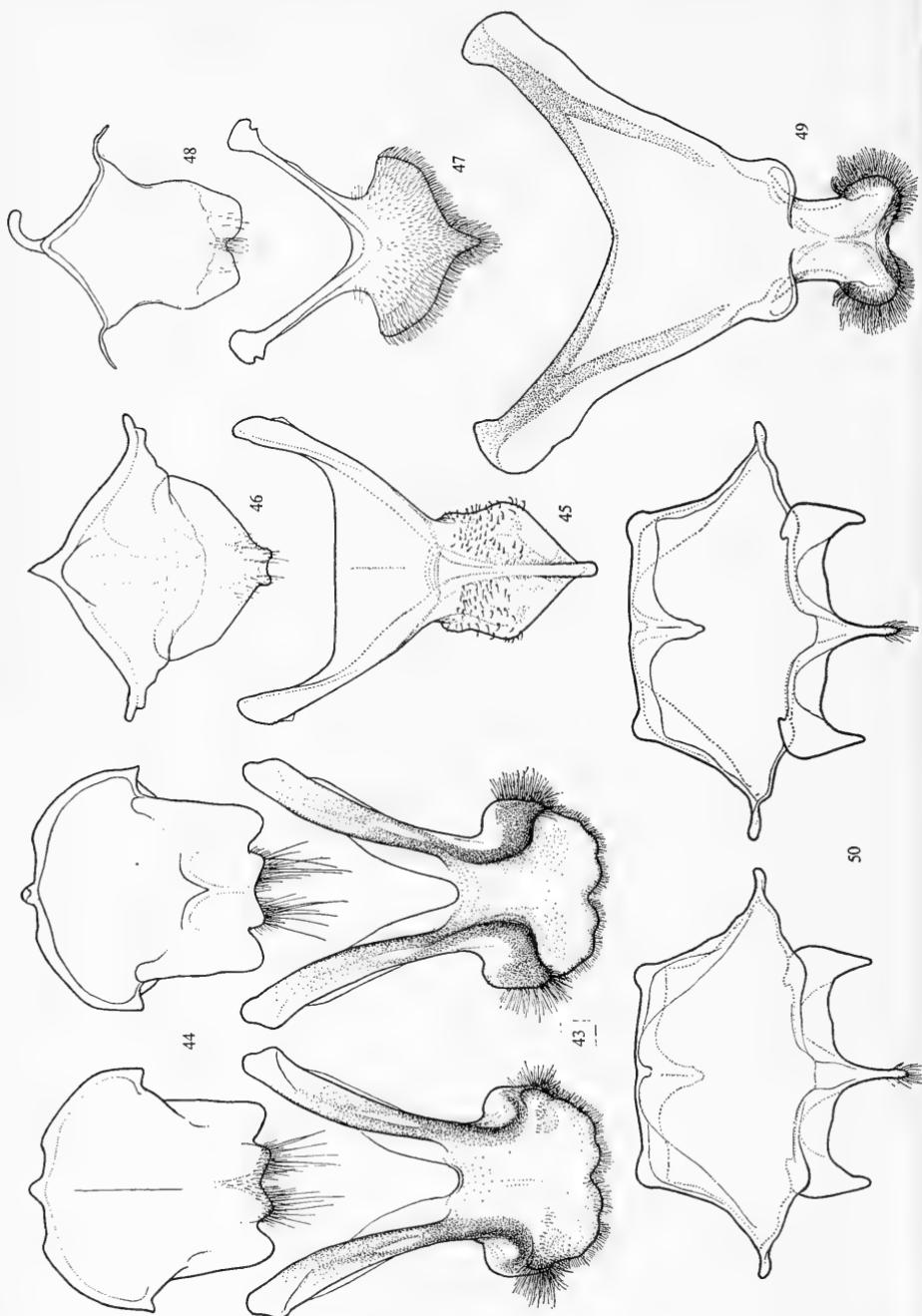


Fig. 36—42. Sixth gastral sternite of male, ventral and lateral view (36, 37, 39 and 41), and cross-sections of same (38, 40 and 42). Fig. 36, *Anthophora acervorum* (L.), Holland; fig. 37—38, *Emphoropsis laboriosa* (F.), Florida; fig. 39—40, *Habropoda tarsata* (Spin.), Rome, Italy; fig. 41—42, *Elaphropoda impatiens* (Lieft.), Bukit Kutu, Malaya. All figures on the same scale



the type-species *A. acervorum* (L.). The most important structural characters of the male are here illustrated; head, mouth-parts and tarsal claw (fig. 1, 5—8), wings (fig. 20), exposed apical tergites and sternites of abdomen (fig. 24—26 and 36), seventh and eighth sternal plates (fig. 43—44), and genital capsule (fig. 51).

Habropoda F. Smith, 1854

1854. SMITH, Cat. Hym. Brit. Mus. 2 : 318—319 (*Habrophora* F. Sm.), 320 (*Habropoda* nom. nov.), pl. 12 fig. 9—11.

1869. DOURS, Mon. Icon. Anthophora (Mém. Soc. linn. Nord France): 29—34, pl. 1 (partim), pl. 2 fig. 1—6 (col. plate).

1879. PATTON, Bull. U.S. Geol. Surv. 5 : 477—479 (partim, type-species *H. ezonata* F. Smith, 1854 = *Tetralonia tarsata* Spinola, 1838, designated).

1890. DE SAUSSURE, in GRANDIDIER, Hist. Madagascar 20 : 12 (diagnosis).

1897. BINGHAM, Fauna Brit. India, Hym. 1 : 414 (key), 521—523 (partim), fig. 177; not pl. IV fig. 6.

1897. FRIESE, Bienen Europa's 3 : 18, 24 (subgenus).

1899. ASHMEAD, Trans. Amer. Ent. Soc. 26 : 60 (key).

1909. VACHAL, Ann. Soc. ent. France 78 : 11 (key).

1923. FRIESE, Die europ. Bienen : 215—217 (notes).

1930. SCHMIEDEKNECHT, Hym. Nord- u. Mitteleuropas, 2. Aufl.: 780 (key, subgenus).

1943. SANDHOUSE, Proc. U.S. Nat. Mus. 92 : 557.

1948. POPOV, Doklady Akad. Nauk URSS, new ser. 59 : 1673—1676 (partim!), fig. 1 (map).

1958. IUGA, Subfam. Anthophorinae, in Faun. Rep. Pop. Rom. Ins. 9 : 94—97, fig. 40 (wing).

Always excepting the differences found in the wing venation, generic characters applicable to both sexes of *Habropoda* are not very well marked and (for the female) difficult to evaluate. The main characteristics are contained in the aforesighted references, but it should be remembered that in the diagnoses given by DOURS, PATTON, BINGHAM and also POPOV, members of the allied genera *Emphoropsis* and *Elaphropoda* were included. The best general definitions are those supplied by SMITH and DE SAUSSURE, insofar as these are based only upon the Mediterranean forms. I have failed to discover clear-cut characters for the female other than those found in the venation, for I have observed that some features of the mouth-parts, legs and pygidial area are hardly, if at all, different from those of certain large-sized species of *Anthophora*. In both sexes of the more typical species of *Habropoda* the interocellar distance is only little longer than the ocellular distance, whereas in the type-species of *Emphoropsis* the lateral ocelli are more widely separated (ratio about 10 : 7); lastly, in two *Emphoropsis*-like bees (from Vietnam and Fukien, respectively), the reverse condition exists (ratio 8.5 : 10). These differences may be, however, of specific rather than generic

Fig. 43—50. Seventh and eighth sternites, exterior view (43, 44 and 50, left and 45—49), and interior view (43, 44 and 50, right). Fig. 43—44, *Anthophora acervorum* (L.), Holland; fig. 45—46, *Emphoropsis laboriosa* (F.), Florida; fig. 47—48, *Elaphropoda impatiens* (Lieft.), Bukit Kutu, Malaya; fig. 49—50, *Habropoda tarsata* (Spin.), Rome, Italy. All figures on the same scale

significance. Males are easily recognized by a combination of sexual characters, primary as well as secondary; most of these will be apparent from the accompanying figures. An additional feature worth mentioning is, perhaps, the attenuated and curiously flattened flagellar segments of the antennae, which in all males extend beyond the tegulae.

POPOV (1948) has already called attention to the remarkably elaborate form and texture of the invaginated seventh and eighth abdominal sternites in *Habropoda* males. Somewhat beyond half-way their length these plates are distended, bearing transverse and swollen ridges with angulate or tooth-like marginal projections which are heavily sclerotized; the apical portions often bear strong

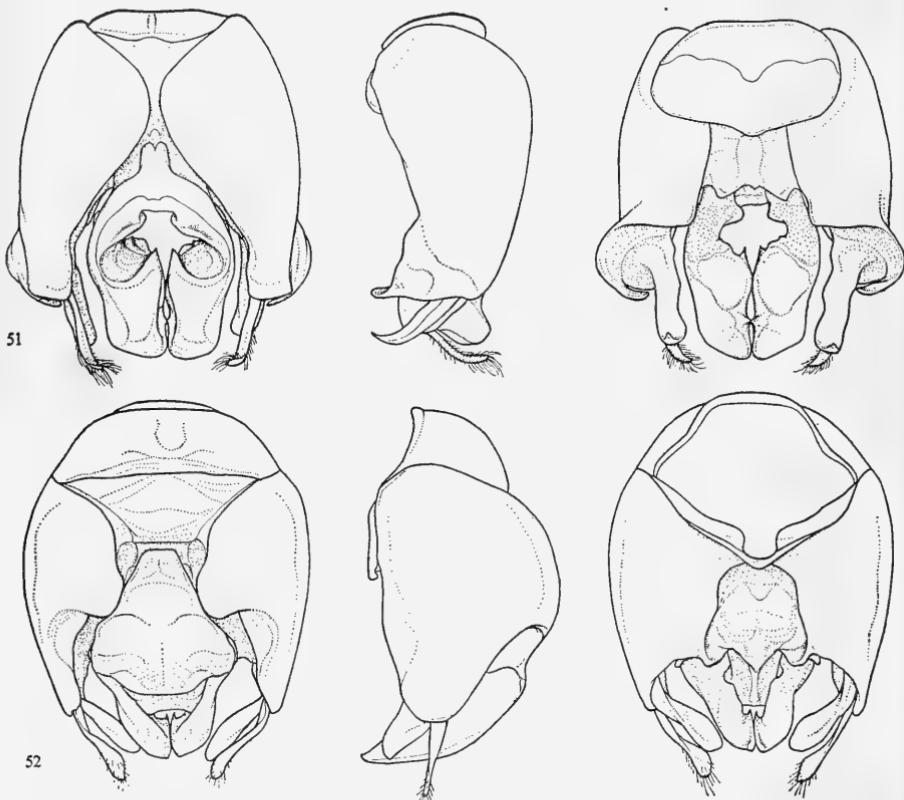


Fig. 51. Genital armature of *Anthophora acervorum* (L.), Holland, dorsal, left lateral and ventral view. Fig. 52, the same of *Emphoropsis laboriosa* (F.), Florida. Enlarged on the same scale

papillae and bristle-like setae (see fig. 49, 57—58, 63—64, and 69—70). The long apodemes and spiculae of these plates are also present in some *Emphoropsis* and *Elaphropoda* but the ridges and processes in *Emphoropsis* are only poorly indicated while they have completely disappeared in the highly specialized *Elaphropoda*.

It will be seen from our illustrations that the resemblance between *Habropoda*

and *Anthophora* is not quite as great as that between either of these and *Emphoropsis*, the latter taking rather an intermediate position in almost every respect.

Pending a characterization of the species reportedly known from the African continent (south of the Sahara), it seems best not to include these in *Habropoda* in the strict sense as applied here. I do not know which species from South and East Africa POPOV (1948) had in mind when recording these on a map (loc. cit.: 1674). He remarks upon four but, with the exception of *H. festiva* Dours (from

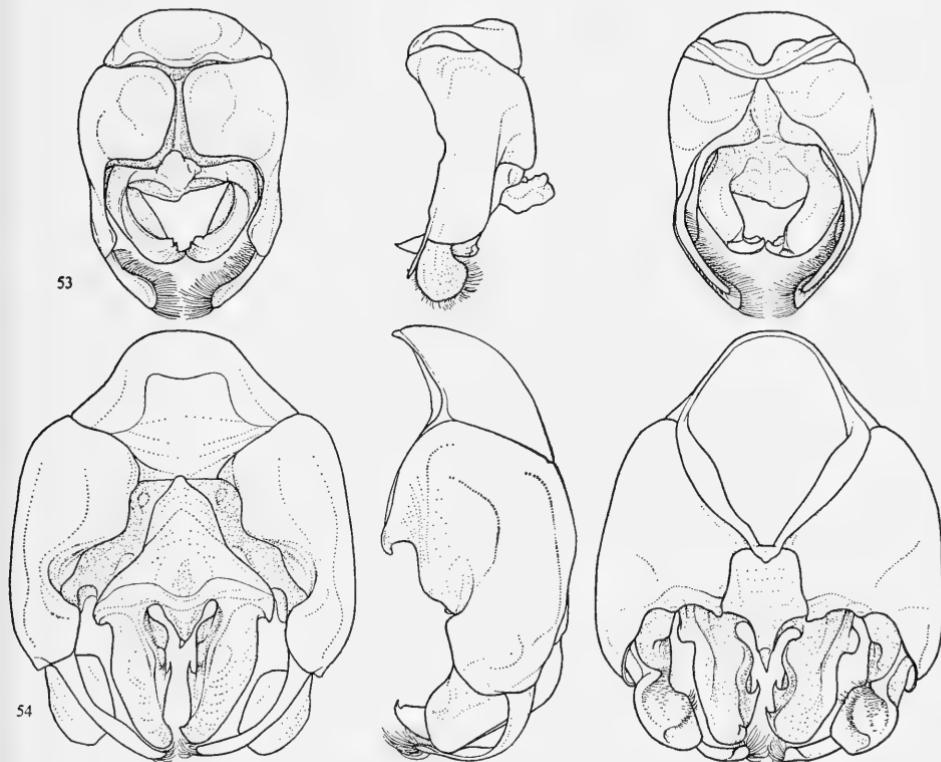


Fig. 53. Genital armature of *Elaphropoda impatiens* (Lieft.), Bukit Kutu, Malaya. Fig. 54, the same of *Habropoda tarsata* (Spin.), Rome, Italy. Enlarged on the same scale

"Cafrérie"), none of them was mentioned by name. I have examined and dissected a male of a species apparently closely allied to *festiva* from Tanganyika but, although this shows some approach towards *Habropoda*, it is surely not congeneric, differing also in the venation.

Following the specific accounts of *Habropoda* proper, I have appended a list of the Asiatic forms questionably referred to it by previous authors. This list may or may not include a remarkable species from China of which I have dissected a male from Fukien, which undoubtedly belongs to yet another genus; it resembles *Elaphropoda* but is wholly different structurally. I hope to deal with this and other forms in a future paper.

Lastly, mention should be made of *Anthophora gracilipes* F. Mor., 1873, from the Caucasus. This is one of a separate species-group of *Anthophora*, which in 1877 was erroneously transferred to *Habropoda* by RADOSZKOWSKI (Horae Soc. Ent. Ross. 12: 334); I have seen both sexes of it.

Distribution. — From the Mediterranean region eastwards through central Asia to China (Peking).

Remarks. — The species of *Habropoda* are probably parasitized by the conspicuous velvet black-and-white pubescent bees of the melectine genus *Eupavlovskia* Popov, whose distribution corresponds very nearly with that of their probable hosts with which they were repeatedly found associated in the field. Nothing further seems to be known of their biology.

Habropoda tarsata (Spinola, 1838)

1838. SPINOLA, Ann. Soc. ent. France 7: 541—542. — ♂ "environ de Civita Vecchia, dr. Leach don." (*Tetralonia*).
1854. SMITH, Cat. Hym. Brit. Mus. 2: 320, pl. 7 fig. 6—6a (♂ ins. & leg). — ♀ ♂ Albania (*H. ezonata* sp. n.).
1856. SICHEL, Bull. Soc. ent. France (3) 4: xix. — ♂ Florence; ♂ Sicilia (*Anthophora Passerini* sp. n.).
1869. DOURS, Mon. Icon. Anthophora: 31—33, pl. 2 fig. 3—4 (♀ ♂ colour plate, ♂ hind leg). — ♀ ♂ Greece.
1874. DOURS, Cat. syn. Hym. France, Mém. Soc. linn. Nord France 3: 2 (first record in France: Hyères).
1876. MORAWITZ, Horae Soc. ent. Ross. 12: 5, 31 (Caucasus).
1878. MORAWITZ, Ibid. 14: 8 (Tauskaja, Caucasus).
1890. DE SAUSSURE, in GRANDIDIER, Hist. Madagascar 20: 12 (key) (*H. ezonata* Smith).
1897. FRIESE, Bienen Europa's 3: 24—25 (key), 51—53 (descr., distrib., ethol.) (*Podalirius tarsatus*, and as subgenus).
1913. ZAVATTARI, Boll. Mus. Zool. Anat. comp. Torino 28: 1. — ♀ ♂ Rodi (= Rhodes) (*Anthophora*).
1921. FRIESE, Archiv f. Naturgesch. A. 87: 166. — Amanus Mts.
1923. FRIESE, Die europ. Bienen: 215, 217, 226 (flower records, notes), fig. 55 (wings).
1930. SCHMIEDEKNECHT, Hym. Nord- u. Mitteleuropas: 780, 785 (key ♀ ♂) (subgenus).
1948. POPOV, Doklady Akad. Nauk URSS, new ser. 59: 1675 (distrib.).
1958. IUGA, Subfam. Anthophorinae, in Faun. Rep. Pop. Rom. Ins. 9: 97 (key) — 99. — ♂ ♀ Romania: Tulcea.¹
1964. COMBA, Mem. Soc. Ent. Ital. 43: 44. — ♂ ♀ Lazio, Italy.

For good descriptions of this handsome bee reference can be made to the literature and also to the illustrations supplied in the present paper. The head is shown in fig. 3, the tarsal claw, mouth-parts and wings in fig. 14—16 and 22 respectively, the male gastral terminalia in fig. 30—31, 39—40 and 49—50, and the genital apparatus in fig. 54.

Distribution. — Originally described from Italy (Rome), the species is probably widely distributed in the Mediterranean basin and southwest Asia. The following localities can be recorded. France: Le Trayas, Le Lavandou and Hyères (Var); Nice (Alpes maritimes). — Italy: Bolzano (Bozen, Tirol); environs of Bologna (Emilia); environs of Genova (Liguria); Firenze and Castiglioncello near Livorno (Toscana); environs of Rome and Acilia (Lazio); Portici and Castel-

Iammare (Campania); Calabria; Sicily. — Romania: Tulcea.¹⁾ — Jugoslavia: Pola (Istria); Split (Spalato); Treska valley, Urosevac, Skopje and Katlanovska Banja (Macedonia). — Bulgaria: Krupnik. — Albania. — Greece: Corfu; Athens (Mt. Imitos); Attica (Limni Marathonos); Kalávrita (Peloponnesus); Samos; Tinos (Cyclades); Rodhos (Rhodes). — Asia Minor (Turkey): Marmaris and Ula (Mugla Prov.); Finike (Antalya Prov.); Gözne (Mersin Prov.); Amanus Mts. (Gavur Daglari). — Caucasus and Transcaucasus: various localities.

Remarks. — *H. tarsata* is an early spring species, occurring from March to the first half of May in low country; it is often found in company of *H. zonatula*. Flower records are: *Coronilla emerus*, near Krupnik 300 m, leg. PITTONI (VERHOEFF in litt.); *Coronilla emerus*, *Anchusa* and *Ajuga*, near Bolzano (FRIESE, 1897); *Echium alissimum* and *Salvia sclera*, at Broshom, 800 m, Caucasus (MORAWITZ, 1876); *Muscari comosum*, in southern France (BARENDRICHT in litt.); male also on *Prunus persica* (FRIESE, 1923) and *P. amygdalus* (IUGA, 1958).

Habropoda tadzhica Popov, 1948

1948. POPOV, Trans. Tadjik Br. Akad. Sci. URSS 8: 31—34, fig. a—e (♂ struct.). — ♀ ♂ Tadzhikistan.

Material. — 1 ♂ 1 ♀ (paratypes), labelled (in Russian) "Village Kwak, 2000 m, 35 km N of Dushanbe, 10 & 20.VI.1937, V. Gussakovski" and "Habropoda tadzhica sp. nov. Popov", det. V. POPOV 1947, in Mus. Leningrad.

This species comes nearest *H. tarsata*. The original description is incomplete and does not do full justice to the nature of the pubescent body pattern and the peculiar structure of the legs and terminalia of the male. The abdomen is neither tricoloured (*tarsata*) nor banded (*zonatula*), but uniformly clothed with rather long and dense golden yellow hair. The bright yellow clypeus of the male is marked with black as in the species just mentioned, the size of the spots being intermediate between the two. Like *H. tarsata* the fore legs are of simple structure but the long spine-like coxal process is reduced to a short plate-shaped lamella. Femur and tibia III are greatly swollen, the inner carina of the tibia terminating in a short tooth-like subapical projection; the smooth and shiny inner surface of the greatly modified basitarsus (fig. 55) is deeply hollowed out, the whole structure smaller than in *tarsata* and shaped differently. The 7th and 8th sternal plates are shown (fig. 57—58), the 8th sternite bearing more likeness to that of *tarsata* (fig. 50) than to *zonatula* (fig. 64), and considering also the structure of the genital capsule with its appendages (fig. 56), *tadzhica* appears to be most closely related to *tarsata*. This resemblance applies also to the female pygidial plate, which in the latter is more narrowly triangular and pointed than it is in *zonatula* and allies.

¹⁾ This Romanian record was taken from MORAWITZ and possibly confused with Tauskaja (Tauz in Azerbeidshan), as given by MORAWITZ.

Habropoda moesta Popov, 1952

1948. POPOV, Doklady Akad. Nauk. URSS, new ser. 59 : 1673 (Kopet Dagh, sine nomine).
 1952. POPOV, Trav. Inst. Zool. Acad. Sci. URSS, Moscou 10 : 113—114. — ♀ Kopet Dagh.
 1960. PONOMAREVA, Ibid. 27 : 161 (flower record).

Material. — 1 ♀ labelled (in Russian) Iiol. Dere/W. Kopet Dagh, 20.V.1953, Ponomareva, on *Lonicera floribunda*, in Mus. Leningrad.

Male unknown. The type is from Germab, Kopet Dagh, LEDER (collector?), in Mus. Leningrad. The present specimen, identified by A. PONOMAREVA, tallies with the description. General appearance similar to *H. zonatula* and *balassogloei*

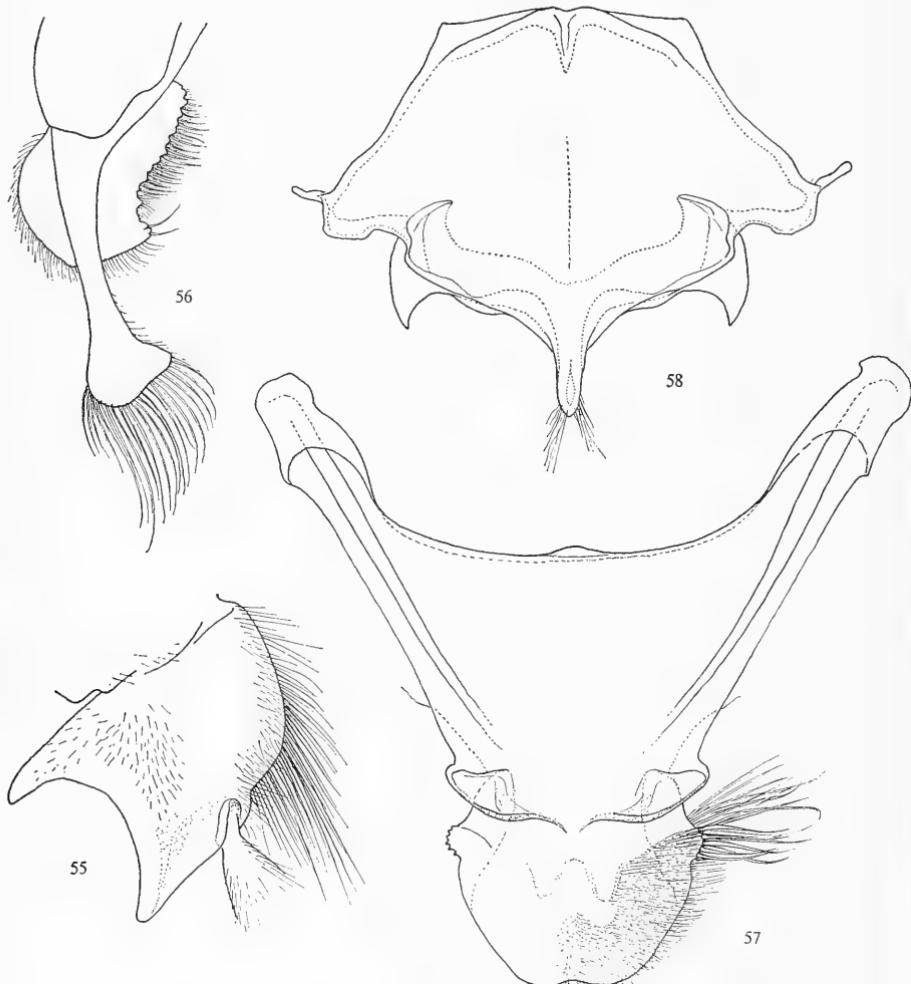


Fig. 55—58. *Habropoda tadzhica* Popov, paratype male, Tadzhikistan; fig. 55, left basitarsus of hind leg, exterior view; fig. 56, apex of gonocephalum, showing gonyostyli; fig. 57 and 58, seventh (57) and eighth (58) sternal plates, exterior view

but the abdominal pubescence covers most of the exposed tergal surface and the anterior limit of the dense apical banding is effaced by the presence of much shorter and scantier pale hairs covering the basal portions of tergites 2—4. There is also a greater abundance of longish erect hair interspersed between the appressed pubescence and this has led POPOV to associate this species with *H. tarsata* rather than *ezonata* and immediate allies. His view is supported by the pygidial plate of *moesta* being more convex and more definitely pointed than in *ezonata*. It is, in fact, shaped similarly to that of *tadzhica* and *tarsata*, the last two being unquestionably intimately allied species.

Habropoda zonatula F. Smith, 1854

1854. SMITH, Cat. Hym. Brit. Mus. 2 : 319, pl. 7 fig. 7 (♂ leg). — ♀ ♂ Albania (*H. zonatula* sp. n.).
 1869. DOURS, Mon. Icon. Anthophora : 30—31, pl. 2 fig. 1—2 (♀ ♂ colour plate). — ♀ ♂ Greece.
 1874. MORAWITZ, Horae Soc. ent. Ross. 10 : 133—134 (addit. descr.). — ♂ Bacu, Daghestan.
 1876. MORAWITZ, Ibid. 12 : 5 (Azchur, Caucasus).
 1890. DE SAUSSURE, in GRANDIDIER, Hist. Madagascar 20 : 12 (key).
 1897. FRIESE, Bienen Europa's 3 : 24—25 (key), 53—55 (descr., distrib., ethol.) (*Podalirius zonatus*).
 1923. FRIESE, Die europ. Bienen : 215, 217, 226 (flower records, distrib. etc.).
 1930. SCHMIEDEKNECHT, Hym. Nord- u. Mitteleuropas : 780, 784 (key ♀ ♂) (subgenus).
 1948. POPOV, Doklady Akad. Nauk URSS, new ser. 59 : 1675 (distrib.).
 1954. IUGA, Bull. stiint. Acad. Rep. Pop. Rom. 6 : 792.
 1957. MOCZAR, Fauna Hung. 19. Apidae: 22 (records in Hungary) (*Anthophora*).
 1958. IUGA, Subfam. Anthophorinae, in Faun. Rep. Pop. Rom. Ins. 9 : 97 (key), 99—100, fig. 41—42 (♂ struct.). — ♂ ♀ Romania.
 1958. MOCZAR, Rovart. Koslem (Fol. Ent. Hung.) 11 : 404 (records in Hungary & flower records) (*Anthophora*).
 1964. COMBA, Mem. Soc. Ent. Ital. 43—44. — ♀ Lazio, Italy.

Superficially, the female of this conspicuous banded bee is more like *Anthophora* or some large-sized *Amegilla* than any of its congeners. From the former it can be distinguished, apart from the neural characters, by the narrow malar space and the widely distant lateral ocelli; from *Amegilla* it differs by the presence of pulvilli between the tarsal claws and other characters. The face-marks and morphological details of a male from Greece are here shown in fig. 59—64.

Distribution. — Like *H. tarsata* a spring species, first described from Albania. Widely spread and, though apparently very local, showing a distribution that broadly overlaps the range of *tarsata*. The localities known to the writer are as follows. **F r a n c e** : Hyères (Var). — **I t a l y** : environs of Rome (Lazio); Brindisi (Apulia); Sicily: Mt. Etna (Mte. Rossi, 800 m) and Taormina (Mte. Ziretto, 200 m). — **M a l t a**. — **H u n g a r y** : various localities, a.o. Cinkota and environs of Budapest. — **R o m a n i a** : "Tultscha" (? Tulcea); Techirghiol, and in Craiova. — **J u g o s l a v i a** : environs of Prilep (Macedonia). — **A l b a n i a**. — **G r e e c e** : Thessaloniki (Saloniki, Macedonia); Olympia and Messene (Peloponnesus); Ionian Islands. — **A s i a M i n o r** (Turkey): Marmaris and Ula (Mugla Prov.); Cubuk (Ankara Prov.); Bozdogan (Aydin Prov.);

Amanus Mts. (Gavur Daglari). — Azerbeidschan (Caucasus): Bacu. — Transcaucasus: various localities. — According to Mr. E. STANEK (in litt.), the species has recently been discovered also in Czechoslovakia.

Remarks. — There is an old record by FRIESE (1897: 55) who found the bees in Hungary, nesting in loamy soil on the roadside between Rákos-Kereshtur and Czinkota (east of Budapest). The same author mentions *Melecta funeralaria* (= *Eupavlovskia funeralaria* (F. Smith) as its parasite. Flower records for the female in Hungary are *Salvia* and *Vicia* (FRIESE, 1897 and MOCZAR, 1958); IUGA (1958) observed that in Romania males frequent the flowers of *Robinia pseudacacia*.

***Habropoda oraniensis* (Lepeletier, 1841) comb. nov.**

1841. LEPELETIER, Hist. Nat. Ins. Hym. 2: 39—40. — ♀ ♂ Oran (*Anthophora oraniensis* sp. n.).
 ?1849. LUCAS, Explor. Sci. Algérie, Zool. 3: 143—144, Hym. pl. 1 fig. 1, 1a—f (♂ ♀ ins.col. & struct.) — ♀ ♂ Oran (*Anthophora*).

Material. — Type series, consisting of 2 ♀ and 3 ♂. Lectotype ♀ (by present designation), labelled "Oran" on blue disk, under drawer label "Anthophora Oraniensis ♀" (LEPELETIER's writing in red); lectoallotype ♂ (by present designation), dissected, bearing same labels as lectotype ♀; 1 ♂ 1 ♀, unlabelled. All in the Paris Museum. ♂ (incomplete), under drawer label "Anthophora oraniensis LePell. Oran/coll. Serville, M. de St. Fargeau", in Mus. Torino.

The above specimens quite unsuspectedly turn out to be true *Habropoda*, constituting a species that has always been looked upon as a member of *Anthophora*. It has been no easy matter to find out whether LEPELETIER's bee has anything to do with the *Anthophora oraniensis* of DOURS (1869), LUCAS (1849), FRIESE (1897) or PRIESNER (1957: 79—80). FRIESE placed it in a separate group of his "Subgenus *Amegilla* Friese", together with *A. caroli* Pérez (which is an *Anthophora*) and *fulvodimidiatus* (Dours) (which is a *Helophilidae*); what he thought to be a female of *oraniensis* in all probability is some species of *Amegilla*. The other authors referred to it as *Anthophora* but in no case did they supply enough details to enable its recognition. Even the beautifully executed colour pictures and line drawings in LUCAS's work give no clue to reveal its identity, so that it still remains possible that here also some similarly-looking species of *Anthophora* was mistaken for it.

H. oraniensis resembles *H. zonatula* Smith very closely in most respects. The following additional descriptions may be supplied of the two sexes, one each (out of only five) being still in perfect condition.

Female (lectotype, Oran). — Stature and pubescent pattern as in *H. zonatula*. Vestiture of head silvery white, very dense and decumbent on labrum, gradually acquiring a yellowish white tint on vertex and becoming fox red on temples, occipital region, thorax and first gastral segment; this bright colour changes to brown on the lower portions of the thoracic pleurae. Legs for the greater part black haired; tibiae I and II outwardly with a streak of depressed silvery white tomentum, the black covering inner faces of femora I and II interspersed with pale hairs; outer faces of basitarsi II whitish. Tibia III black, but outwardly with

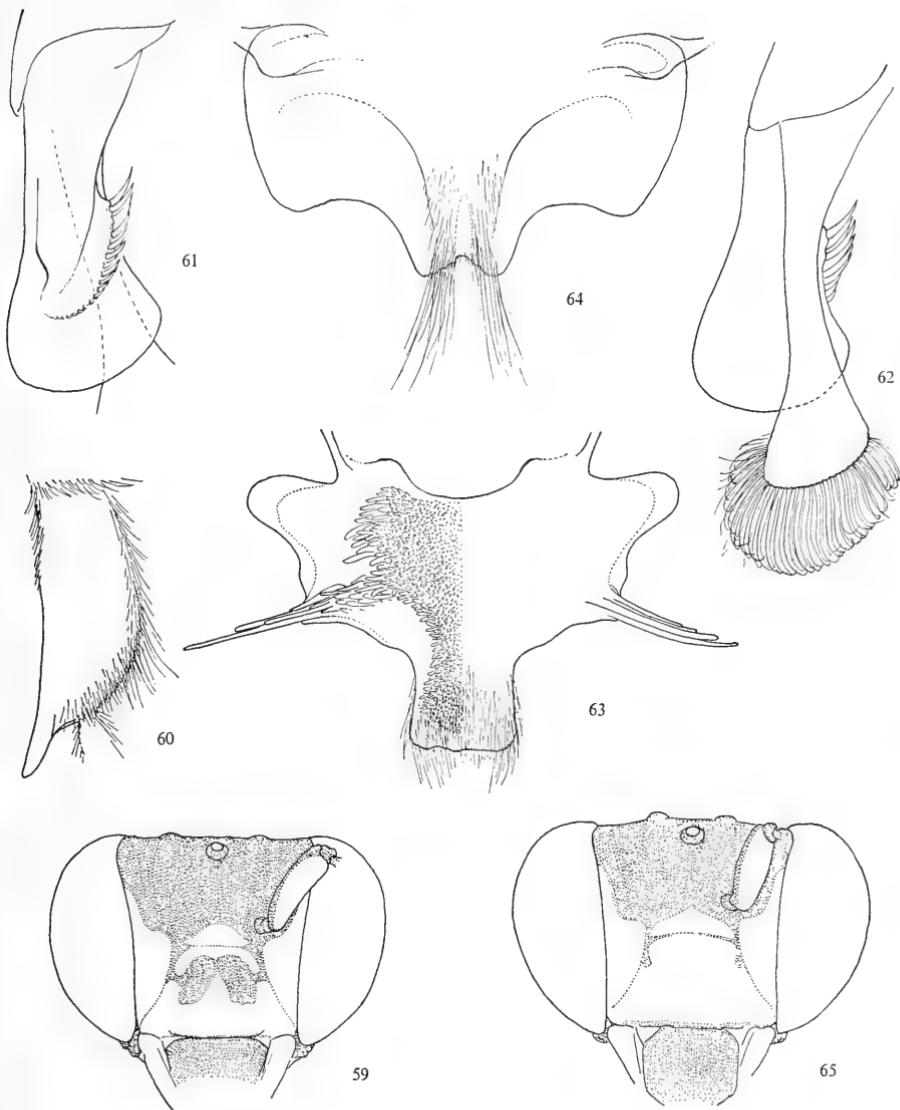


Fig. 59—64. *Habropoda zonatula* F. Smith, male, Peloponnesus; fig. 59, frontal view of head, showing face-marks; fig. 60, left basitarsus of hind leg, exterior view; fig. 61—62, apex of right (61, ventral view) and left (62, dorsal view) gonocephalum, showing gonostyli; fig. 63—64, apical portions of seventh (63) and eighth (64) sternites, exterior view. Fig. 65. *Habropoda oraniensis* (Lep.), lectotype male, Oran (Algeria), frontal view of head, showing face-marks

a broad, wedge-shaped area of silvery pubescence; outer face of basitarsus III black, inner face chestnut to dark ferruginous. Wings exactly as in *H. zonatula*. Pubescence of first gastral segment dense, erect, fox red; integument of tergites 2—4 shiny, pubescence short and scanty, deep black, each segment bordered apically with a narrow, sharply defined band of snow white hair leaving off abruptly at the sides; tergite 5 densely clothed with black hair entirely concealing

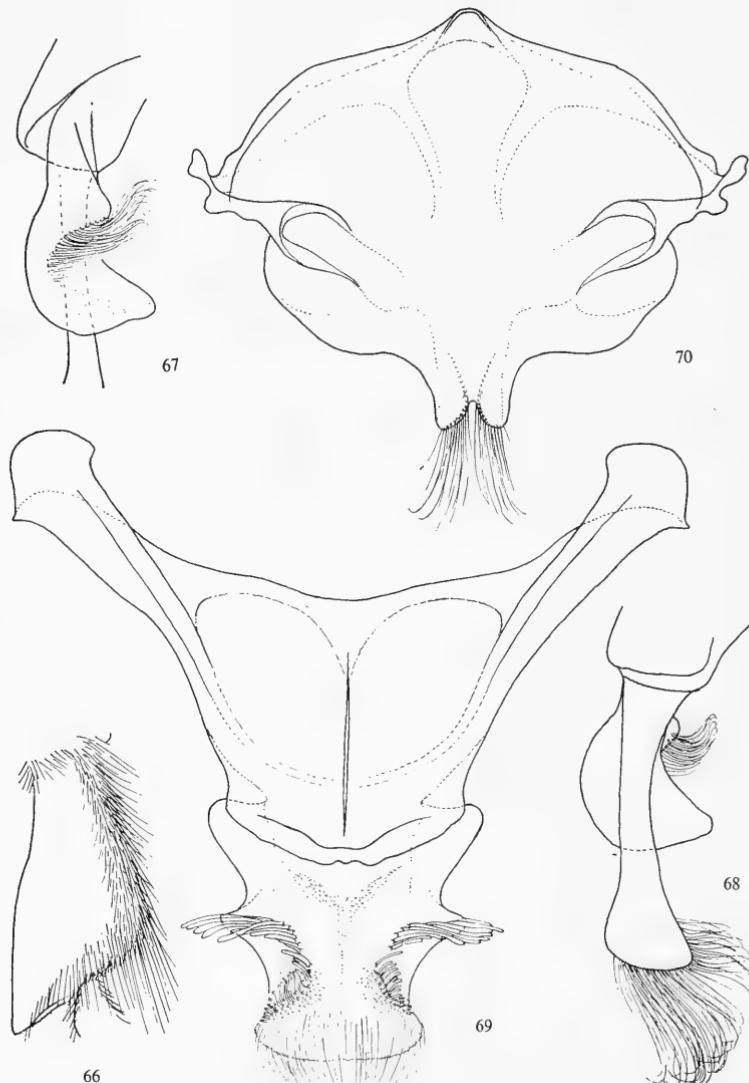


Fig. 66—70. *Habropoda oraniensis* (Lep.), lectotype, Oran (Algeria); fig. 66, left basitarsus of hind leg, exterior view; fig. 67—68, apex of right (67, ventral view) and left (68, dorsal view) gonoforceps, showing gonostyli; fig. 69—70, seventh (69) and eighth (70) sternites, exterior view

surface; pygidial segment black. Ventral surface of gaster mainly dark in the centre, densely fringed with whitish laterally; apical pubescent band of tergite 4 broadly continuous underneath so as to cover also the sternal surface, the next segments also clothed with long white hair.

Male (lectotype). — General aspect, size and texture almost as in *H. zonatula*; differs from it in the reduced face marks, more brightly coloured pubescence and in structural details of legs and terminalia.

Antennal segments 4—13 missing. Legs generally slightly more robust, procoxal process very similar but more evenly and less strongly downcurved; shape of basitarsus I similar to *zonatula*, but basitarsus III relatively shorter and more expanded distally, the apical process thicker and bluntly triangular, not lanceolate as in *zonatula* (cf. fig. 60 and 66). Clypeus yellow, with indication only of dark basal markings (cf. fig. 59 and 65). Pubescent pattern much as described for the female, brighter than in *zonatula*; decumbent and white on labrum, changing to yellowish white on clypeus and brightening to orange on vertex; vivid thoracic pubescence becoming lighter, almost white, laterally. Legs clothed with silvery white tomentum. Transverse apical bands of gastral tergites 2—5 distinct, but on 6 only the sides are white-haired; ventral surface of 3—5 clothed with white hair laterally.

The contour and sclerotization of the 6th gastral tergite and exposed sternal plates are very nearly identical in the two species compared, but contrasting characters are found in the shape of the apical portions of the seventh and eighth sternites, the surface and borders of which are more or less profusely adorned with papillae, thick sensory(?) setae and fine pubescence, variable in size, arrangement and density, as shown (cf. fig. 63—64 and 69—70). When comparing the genital armature of *oraniensis* with that of *zonatula*, it will be observed that slight but well-marked differences also exist in the shape and vestiture of the gonocoxite, whose two branches (gonostyli) are shown in outer and inner aspect (cf. fig. 61—62 and 67—68).

LEPELETIER's cotypes (♂ and ♀ in Mus. Paris and ♂ in Mus. Torino) are badly damaged and partly eaten away by insect pests, but all specimens are undoubtedly conspecific.

Distribution. — Algeria.

Habropoda balassoglooi Radoszkowski, 1877

1877. RADOSZKOWSKI, Hor. Soc. ent. Ross. 12: 334—335. — ♂ Etschmiadzin (Caucasus).
1948. POPOV, Doklady Akad. Nauk URSS, new ser. 59: 1673—1675 (remarks, distrib.).

Material. — Transcaspia: 1 ♀, Kasakhstan, labelled "Nikolajewka/
zonatula Smith ♀ /Habropoda balassoglooi Rad. ♀, V. POPOV det.", in Mus.
Leningrad.

The female of this bee is so much like *H. zonatula* in general appearance and vestiture that it can be easily mistaken for it. The description of the leg structure

of the male¹⁾ also corresponds with *zonatula* but, since it belongs to a group of closely similar species even in respect of the male terminalia, I have no hesitation in following POPOV and considering it a distinct species. Males are not available for comparison but in the female of *balassoglooi* the pubescent abdominal bands are distinctly broader than in *zonatula* and the marginal hair fringes at the apical sternites are longer, denser and white instead of yellow, the long pubescence at the temples, thoracic sides and on the scopa being also silvery. Apical hair band of gastral tergite 5 palest silvery yellow sparsely intermixed with light brown and hair on both sides of pygidial plate light brown (all bright ferruginous in *zonatula*). Pubescence on inner faces of middle and hind basitarsi and penicillus dark brown, not bright golden yellow as in *zonatula*. The best character I have found in the antennae, which in *balassoglooi* are distinctly longer than in *zonatula*; the first flagellar in *balassoglooi* is about 3.5 times as long as its apical width, in *zonatula* less than 3 times, the length of the first four flagellar segments in *balassoglooi* being in the ratio 28.5 : 10 : 10 : 10, in *zonatula* 25 : 10 : 10 : 10. In both species the pygidial plate is flat, finely transversely striate, the sides only slightly converging towards the rounded and almost truncated apex.

Distribution. — Caucasus and Transcaspia.

Habropoda pekinensis Cockerell, 1911

1911. COCKERELL, Proc. U.S. Nat. Mus. 39 : 642—643. — ♂ ♀ Pekin, China.
 1936. GUSSAKOWSKIJ, Trav. Inst. Zool. Acad. Sci. URSS, Moscou 2 (4) : 735—736, fig. 1—2 (leg structures). — ♂ Prov. Ala-Shan, W. China (*H. alaschanica* sp. n.).
 1948. POPOV, Doklady Akad. Nauk URSS, new ser. 59 : 1674 and 1675, footnote (synonymy).

Although I have not seen specimens, it is evident from the description that this bee is a true *Habropoda*, most closely related to *H. zonatula* Smith, with which the species was compared by COCKERELL himself. The male is described as having the characteristic long backwardly directed spine at the anterior coxa and the greatly flattened lamina at the hind basitarsus, thus agreeing with the European species. I have adopted the synonymy as given by POPOV; yet it seems necessary to compare GUSSAKOWSKIJ's figures of the leg structure of *H. alaschanica* with the type of *pekinensis* in the U.S. National Museum, Washington.

Distribution. — West and East China.

Asiatic species described in *Habropoda*, or doubtfully referred to *Emphoropsis* but requiring further investigation, are the following (arranged in chronological order):

H. radoszkowskii Dalla Torre, 1896 (Cat. Hym. 10 : 285, nom. nov. for *Habropoda montana* Radoszkowski, 1882 (Wiadom. nauk przyrodz. Warszawa 2 : 77, ♀ ♂ Himalaya, nec *Anthophora montana* Cresson, 1869).

¹⁾ Of the legs RADOSZKOWSKI says: "à la base de chaque trochanter des pattes antérieures on voit une forte apophyse pyriforme d'un jaune pâle, avec l'extrémité émoussée; les jambes de cette paire sont renflées au milieu; les cuisses des pattes postérieures très renflées, creusées un peu en gouttière, les jambes assez renflées et le premier article des tarses dilaté, aplati et extérieurement bordé de pils gris." (loc. cit.: 335).

I have not been able to locate the type of *H. montana* but FRIESE (1897 : 305—306) refers to the latter by quoting the latin diagnosis ("♀ sarothrum rufo, metatarso posteriori nigro-villosis; ♂ tibiis anterioribus fortiter albido-ciliatis, metatarso posteriori dente auriculato terminato."). A female in the British Museum from Sikkim, Darjeeling, 7000 ft., 4.94, identified by BINGHAM himself, conforms exactly with his description and figure (1897), as do two unnamed females from Kumaon, United Prov., W. Almora Div., Nov. 1919, H.G.C., in the same museum. However, the leg structure of a conspecific male (Shillong 10.03, TURNER coll. 1912-111) differs from that described by BINGHAM, who writes: "posterior femora very slightly swollen, each posterior tibia produced at its inferior apex into a compressed, thin, rounded plate." As it is not the unmodified tibia but the posterior basitarsus which is produced apically (thus conforming with RADOSZKOWSKI's statement), the sexes were probably wrongly associated by BINGHAM. Also in the British Museum collection is a good series (both sexes) of a closely similar species recently collected in the Taplejung District (East Nepal Exped. 1961—62). Though undoubtedly closely related, these Shillong and Nepalese bees differ from each other both in structure and body colour, despite the fact that all agree in having the posterior tibia unmodified and the basitarsus widened and provided interiorly with a smooth ridge ending in a blunt tooth. An examination of the hidden sternites reveals that all of them are unquestionable *Habropoda*. These plates, though less heavily sclerotized than in the more typical members of the genus, are of the same characteristic form, markedly constricted and transversely ridged about half-way their length and provided apically with the same minute papillae. The same applies to at least three more species from various high altitude localities in the Himalayas and Assam (Shillong), of which specimens are available for further study in the British Museum collection.

H. krishna Bingham, 1908 (Rec. Ind. Mus. 2 : 366—367, ♂ Sikkim, Darjeeling, 7000 ft.).

Status uncertain. The author says that it comes nearest to *H. radoszkowskii*, as determined by him. Whole body densely covered with long brownish yellow pubescence. Mandibles and clypeus white, only the sutures of the latter black. Orbita parallel. Ocelli in equilateral triangle, but description of their position obscure. Legs normal.

H. turneri Cockerell, 1909 (Entomologist 42 : 308, ♀ Shillong Assam).

Male unknown. A mounted female in perfect condition (British Museum coll.), now before me, bears TURNER's written label "Shillong 9.03" and a second printed one with "Assam R. E. Turner 1910—225". This is obviously a topotype, agreeing with the original description in every respect. A densely pubescent bee with a strongly contrasting *Bombus*-like colour pattern of black, canary yellow and orange-red. Contrary to COCKERELL's statement on the type, the present example is compactly built and of normal proportions. The face and mouth-parts as well as the placement of the ocelli are as in *Habropoda*; the slender sickle-shaped mandibles bear a single subapical interior tooth and the tongue is of moderate length. Unusual features are (1) the greater length of the marginal

cell of the fore wing and (2) the minute size of the pulvilli between the tarsal claws, characters which it shares alike with *H. mimetica* Ckll., from China, which appears to be closely allied.

***H. tainanicola* Strand, 1913** (Suppl. Entom. Berlin 2 : 51—52, ♀ Formosa).

Male unknown. Position of first recurrent vein of fore wing slightly variable: usually received slightly before end of second submarginal, more rarely interstitial with its distal side. Body pubescence of head, thorax and gastral segments 1 to 3—4 black, for the rest orange. Clypeus prominent, black. According to STRAND the species resembles *H. radoszkowskii* D.T. (*sensu* BINGHAM!).

***H. rowlandi* Meade-Waldo, 1914** (Ann. Mag. Nat. Hist. (8) 13 : 50—51, ♀ ♂ Shillong Assam).

Appears to be allied with *H. turneri* Ckll., the male of which is unknown. The male of *rowlandi* has the clypeus totally pale yellow without any indication of a keel; the antennae are wholly black, the scape not yellow, as is so prevalent in males of this genus. In the female the face is all black, the legs ferruginous and the pubescence golden brown. I noted that the type (no. 637), in the British Museum, is not a true *Habropoda*, but the terminalia of the male have not yet been examined.

***H. hookeri* Cockerell, 1920** (Ann. Mag. Nat. Hist. (9) 6 : 202—203, ♀ Simla, 7000 ft. and ♀ Mussoorie, 7000 ft.).

Male unknown. According to COCKERELL nearly agrees with *H. radoszkowskii* D.T. (= *montana* Rad.), as described by BINGHAM. It is held distinct from that species on account of the unmodified and not specially broadened hind tibia. These are, however, characters of the male, not of the female, and since COCKERELL had no male of *hookeri*, this distinguishing character does not hold good.

***H. mimetica* Cockerell, 1927** (Amer. Mus. Novit. 274 : 15, ♀ Yen Ping, China).

According to COCKERELL, this species is allied to *H. turneri* Ckll. The male has not so far been described but will, it is hoped, be made known soon. I have examined a series of both sexes from Fukien (SE China) and, as these do not fit the diagnosis of either *Habropoda* and *Elaphropoda*, a new genus (or subgenus) will be necessary to accommodate the species.

***H. sutepensis* Cockerell, 1929** (Ann. Mag. Nat. Hist. (10) 4 : 132—133, ♂ Siam).

A small, densely pubescent species with normally shaped legs and a non-pro-tuberant yellow clypeus. I have examined the types of either sex in the British Museum collection (♂, no. 652), the female having also been described by COCKERELL. The species approaches *Elaphropoda* in several characters but probably requires a new generic (or subgeneric) name to hold it.

H. nubilipennis Cockerell, 1930 (Ann. Mag. Nat. Hist. (10) 6: 52, ♀ Foothow, China).

I agree with COCKERELL that the type, which I examined in the British Museum collection (no. 645), is not the female of *H. percarinata*, the latter being now transferred to *Elaphropoda*. The two species are not even congeneric but the exact status of *nubilipennis* (male unknown) remains to be established. The head of *H. nubilipennis* is shaped differently, the clypeus being shorter, considerably less swollen than in *Elaphropoda*, while the brown face marks are more sharply defined and shaped otherwise, as compared with members of that genus. It approaches a Chinese species-group of which *H. mimetica* is one of the participants but, pending the discovery of the male, this is all that can be said.

H. sinensis Alfken, 1937 (Ent. & Phytopath. 5: 404—405, ♀ ♂ Chekiang, China).

It is absolutely impossible from the description alone to obtain an impression of this bee, nearly all characters mentioned being insignificant.

Emphoropsis Ashmead, 1899

1879. PATTON, Bull. U.S. Geol. Survey 5: 477—478 (partim, sub *Habropoda*).
 1899. ASHMEAD, Trans. Amer. Ent. Soc. 26: 60 (key, gen. nov.).
 1901. COCKERELL & COCKERELL, Ann. Mag. Nat. Hist. (7) 7: 48 (type-species *Anthophora floridana* F. Smith, 1854 = *Bombus laboriosus* F., 1804).
 1905. COCKERELL, Bull. South. Calif. Acad. Sci. 4: 99—100 (revision).
 1909. COCKERELL, Proc. U.S. Nat. Mus. 36: 414 (*Emphoropsis muribirta murina* Ckll. 1909, first taxon included in *Meliturgopsis* Ashmead, 1899: 62 = *Emphoropsis* Ashmead, 1899: 60, teste COCKERELL).
 1943. SANDHOUSE, Proc. U.S. Nat. Mus. 92: 547, 572.
 1944. MICHENER, Bull. Amer. Mus. Nat. Hist. 82: 285—286 (incl. key).
 1951. MICHENER, in MUESEBECK et al., Agric. Mon. U.S. Dept. Agric. Wash. 2: 1239—1240 (catalog).
 1962. MITCHELL, Tech. Bul. N. Carol. Agric. Exp. St. 152: 234 (key), 331—332 (diagn., references, etc.), fig. 67 (wings).

This New World genus is included here for comparison with related taxa in the Anthophorini. For descriptions of the type-species, *E. laboriosa* (F.) (= *floridana* Sm.) and other members of the genus, the reader may be referred to the existing literature, the fullest characterization having been published recently by MITCHELL (1962). In the same year, TIMBERLAKE (Ent. News 73: 36—38) described *E. excellens* Timb., an aberrant species from California, the male of which differs remarkably from other members by the structure of its antennae and legs.

Of the described species I have been able to examine both sexes of *E. depressa* (Fowler), *dammersi* Timb., *interspersa* Ckll. and *miserabilis* (Cress.); also the males of *E. laboriosa* (F.) and *pallida* Timb.; and a female of *E. rugosissima* Ckll. In general appearance all these species are closely similar to members of *Anthophora* with which they occur together in parts of their range. The generic characters of the venation are those enumerated and illustrated by PATTON (1879) and MITCHELL (1962). In all species examined the first recurrent vein in the fore wing is received just before the second intercubitus and the transverse median

is placed slightly postfurcal (fig. 21); in several *laboriosa* and a male of *E. miserabilis* these veins are interstitial or coincide in one point, as is also the case in the Chinese "Habropoda" and all *Elaphropoda* (fig. 23). It will be seen that the latter differs from *Emphoropsis* in the much longer marginal cell and numerous structural characters. MICHENER (1944) has suggested that some of the bees described in *Habropoda* from East Asia (e.g. China) are in reality *Emphoropsis*. This may be true, as the resemblance is quite striking. In the Chinese species group the venation is scarcely more like true *Habropoda* than *Emphoropsis*, but since not one of the East Asiatic forms has yet been studied in sufficient detail, a decisive answer to this question can not yet be given.

Emphoropsis laboriosa (Fabricius, 1804)

1804. FABRICIUS, Syst. Piez.: 352, no. 51. — ♀ Hab. in Carolina (*Bombus laboriosus* nov.).
 1854. SMITH, Cat. Hym. Brit. Mus. 2: 339—340. — ♀ ♂ East Florida (*Anthophora Floridana* sp. n.).
 1962. MITCHELL, Tech. Bul. N. Carol. Agric. Exp. St. 152: 332—333 (descr., distrib., ethol.), fig. 94 (head ♀ ♂), 95 (♂ terminalia).

Material. — Florida: ♂ (dissected), Florida, Dunedin, 30.I.1932, A. L. MELANDER, identified by P. A. TIMBERLAKE.

Good figures of the head (male and female), wings and male terminalia are to be found in MITCHELL's work (loc. cit.). These conform to the illustrations here given, except that the head of the male in fig. 2 was drawn from a slightly different angle of view. Other figures are those of the tarsal claw (fig. 9), mouth-parts (fig. 11—13), wings (fig. 21), seventh tergite (fig. 27—28), transverse section of gaster (fig. 29), sixth sternite (fig. 37—38), seventh and eighth sternal plates (fig. 45—46), and genital capsule (fig. 52).

Elaphropoda gen. nov.

1897. BINGHAM, Fauna Brit. India, Hym. 1: 414, 521—523 (partim), not fig. 177, but with pl. IV fig. 6 (*Habropoda magrettii* Bingh. ♂).
 1944. LIEFTINCK, Treubia, hors sér.: 77—93, fig. 23—31, pl. 42 fig. 5—8 (phot. ♂ ♀ *Habropoda impatiens* sp. n.).
 1965. MICHENER, Bull. Amer. Mus. Nat. Hist. 130: 14, 17—18 and 20 (*Habropoda*).

Medium-sized Anthophorini with elongate body and sparsely pubescent abdomen. Integument dark brown or black, the face, legs and parts of abdomen often predominantly light coloured (ochraceous-orange). Pubescence throughout short and scanty, except on thorax, where it is long and dense; plumose hairs behind orbits, on thorax, and partly also on legs and gastral sternites. Disk of labrum and clypeus sparsely covered with long, erect, bristle-like hairs. Abdomen comparatively long and narrow, that of male even more slender with pointed apex, the intermediate and terminal segments cylindrical in cross-section (fig. 35). Integument well exposed under the short tomentum, tergites not distinctly banded but posterior margins usually with narrow fringe of dense appressed pubescence; hair fringes of sternites longer, erect and plumose.

Head. Labial palpus 4-segmented, longer than galea, first segment very long and attenuated, about three times as long as second, the two apical segments small (fig. 19, 87); galea of proboscis extending back to or slightly beyond base of hind coxa in repose and when extended much longer than abdomen; glossa very long, with appressed pubescence, distal one-third with longer erect hairs. Maxillary palpus subequal in length to stipes, very slender, 6-segmented, second segment longest, separate segments in the ratio of 6 : 23 : 16 : 11 : 7 : 5, about the same in either sex of all species (fig. 18). Structure of head, fig. 4 and 81. Face narrow, inner orbits subparallel, curvature slightly inwardly convex, shortest distance between eyes about midway their length in full frontal view. Ocellorbital distance about twice broader than interocellar distance, but only one-half of the clypeocellar distance. Clypeus longer than its distance from anterior ocellus (clypeocellar distance) and much longer than its width at base (about 5 : 3); strongly protuberant, usually with distinct median longitudinal keel, its greatest depth in side view about equal to diameter of eye. Frontal carina poorly developed, reduced to a short elongate, antero-median tubercle situated at level of antennal sockets. Ocelli placed in a triangle, closely approximated, the anterior one largest, its distance from either posterior ocellus about one-third of the interocellar distance. Malar space distinct, though short, one-seventh to almost one-tenth of its width. Labrum subcordate, only little wider than long, its anterior border entire, but apex distinctly produced. Mandibles with two well-developed interior subapical teeth, the proximal tooth shortest (fig. 82). Antenna slender, of normal length, flagellar segments longer than wide (10 : 8); first joint of flagellum much widened towards apex; ratios of length and breadth as 12 : 9 (♂) and 17 : 9 (♀); length ratios of first four flagellar segments as 12 : 6 : 10 : 10 (♂) and 17 : 6 : 10 : 10 (♂).

Wings as for tribe, with short narrow stigma. Marginal cell of fore wing much longer than distance from its rounded apex to wing tip, free part of marginal cell only little shorter than rest of cell; first submarginal cell shorter than second and third together but longer than third, the second much the shortest though rather high and squarish, with its costal side little shorter than the anal; costal side of third submarginal likewise shorter than anal side; first recurrent vein invariably interstitial with second intercubital vein; fork of basal vein coincident with transverse median, which is hardly curved. Hind wing with transverse median vein moderately oblique and outwardly convex, about half as long as its distance from the fork $M-Cu$, the second abscissa obsolete beyond half-way length of M ; jugal lobe small, lanceolate (fig. 23).

Legs slender, coxae not modified, unarmed; trochanter of hind leg of male enlarged, angular and produced backward, its posterior (caudal) surface flattened, that of female simple and rounded. Hind femur of male conspicuously inflated, its inner surface flat and bounded by two longitudinal keels, the innermost acute, the outer blunt; hind tibia laterally compressed, the inner surface smooth, shiny, slightly hollowed out and bounded by longitudinal sharp keels, in side view the tibia is strongly widened towards apex, ending in a triquetrous lamella. Claws similar in both sexes, deeply cleft, inner ramus shorter and more robust than outer; orbicula and pulvillus (arolia) well developed (fig. 17).

Scopal hairs of female not plumose, rather short and sparse, not at all concealing surface. Basitibial plate of female distinct, subtriangular, apex narrowly rounded, that of male similar and of equal size but poorly defined and this only at extreme apex, which is subacute.

Abdomen slender, more cylindrical than in allied genera, often with integumental maculations; pubescence short and sparse, segments not or only narrowly banded. Seventh gastral tergite of male strongly tapered, sixth sternite usually more distinctly so, apex subacute. Seventh and eighth sternites unmodified, thin and delicate, disk of the former broader than long, finely pubescent with abruptly pointed apex, the latter subrectangular, apex emarginate. Gonostylus at apex of gonocoxite distinct and bipartite, consisting of a long, thin, plate-shaped exterior process, situated dorsad, and a slightly shorter, cylindrical or rod-like interior process, placed more ventrad; penis valves (sagittae) robust and thick, strongly incurved, the broad apices emarginate and/or toothed; membranous midlobe of penis short, transverse. Pygidial plate of female subtriangular, slightly longer than its width at base, apex very broadly rounded.

Type-species: *Habropoda impatiens* Lieftinck, 1944.

Though previous discoveries in Malaya, Borneo and China include bees closely comparable with *E. impatiens*, I have selected this form as the type-species as it is the only one of which both sexes were fully described and illustrated.

The species placed in this new genus recall *Apis* in stature and general appearance, especially the female. They can be easily distinguished from *Anthophora*, *Habropoda* and *Emphoropsis* by the tridentate mandibles, closely approximated ocelli, sparsely pubescent legs and abdomen, and the great length of the marginal cell of the fore wing. Additional features both sexes have in common are: extremely attenuated mouth-parts, strongly elevated narrow face and conspicuously light-coloured legs. Males have modified hind legs and a pointed abdomen, the tapered form of the last visible segments being noteworthy. The apical sternal plates and genitalia are altogether different in shape from those of the allied genera, the former being flat, delicately pubescent structures (fig. 33—34, 41—42, 47—48, 76—80, 84—86, and 88—92). The characters of the legs, venation and genitalia at once exclude relationship with certain species of the *Amegilla florea* (F. Smith) assemblage, which they resemble at a casual glance. Some of the latter are equally striking for their strongly protuberant facial parts, enormously lengthened glossa and short pubescence; they are, however, at once separated by the absence of pulvilli (arolia) between the tarsal claws.

It is of interest also to compare *Elaphropoda* with *Deltoptila* LaBerge & Michener (1963), recently proposed for a group of Anthophorini occurring in Middle America. The authors found it to resemble *Habropoda* more nearly than it does *Emphoropsis*, especially in regard to the slender form of the legs, the short and sparse scopal hairs and, especially, the equilateral ocellar triangle. *Deltoptila* includes several species doubtfully placed in *Habropoda* by early American writers and it will be clear that the authors of the new taxon were entirely justified to remove it therefrom and place it in a genus of its own. It should be borne in mind that *Deltoptila* was compared with *Habropoda* at a time

when *Elaphropoda* had not yet been separated from it as a distinct genus. It is exactly with the last-mentioned group that *Deltoptila* was primarily compared, sharing with it the long proboscis, unusually protuberant face and the features already mentioned. This resemblance is rather surprising but on the other hand there are well marked differences between the two. Chief amongst these are: the longer malar space of *Deltoptila*, the single inner tooth at its mandibles, the much shorter 2nd and 3rd segments of maxillary palpi, the shorter submarginal cell of the fore wing, and the different male genitalia and apical sternal plates.

Significant specific characters appear to be slight and few in number. Nearly all species have been described from single individuals of either sex, thus making it quite impossible to form an opinion about the consistency of any given character. For instance in *E. impatiens*, the only species of which good series of both sexes are available, the extent of "red" colour on the gastral segments was found to vary considerably between individuals and thus proved of no help in the separation of species. In regard to body sculpturing and degree of hairiness all known species seem to be practically alike, even the male sexual organs hardly showing distinctive differences. Under the circumstances all that could be done was to profusely illustrate the few characters most likely to be constant, i.e. the shape of the hind tibia and the penis valves of the male genital apparatus. For details not mentioned under the species discussed hereafter, see the comprehensive specific descriptions of *E. impatiens* (Lieft.) in the writer's previous paper (1944).

Distribution. — Sumatra (terr. typ.); from the Himalayas to southeast China, and through Burma and Malaya to Java and Borneo.

Remarks. — Restricted to the humid rain forests of the lower mountain zone (1450—1700 m alt.). Owing to this peculiar habitat and the extremely swift flight of *Elaphropoda*, these bees are easily overlooked and very rare in collections. The two species known from Sumatra and Java were both caught on flowers of *Impatiens* (Balsaminaceae). The same species in Malaya, Sumatra and Java are presumably parasitized by their nearest melectine relatives of the genus *Callo-melecta* Ckll. discussed also in my 1944 article.

Elaphropoda magrettii (Bingham, 1897) comb. nov.

1897. BINGHAM, Fauna Brit. India, Hym. 1 : 522 (key), 523, pl. 4 fig. 6 (♂ insect). — ♂ Kumaon (*Habropoda magrettii*, n. sp.).
 1909. BINGHAM, Rec. Ind. Mus. 2 : 366 (locality only). — Ferozepore, Punjab (*Habropoda*).
 1920. COCKERELL, Ann. Mag. Nat. Hist. (9) 6 : 201—202. — ♂ Kumaon (*Habropoda fletcheri*, sp. n.) Syn. nov.

Material. — The types of these two Himalayan species were examined by me in the British Museum collection (*magrettii*, no. 638). Both are from Kumaon (northern United Provinces, W of Nepal), COCKERELL's specimen of *fletcheri* bearing a label "Kumaon, Ramgarh, 6000', viii.1918, Fletcher".

A third male, now before me and in the British Museum under *H. magrettii* Bingham, is labelled "Shillong 9.03" (written) and "Assam R. Turner 1905—125" (printed). It agrees with my notes on the type but was received too late for dissection, figuring and incorporation in this paper. It is a rather small specimen with light-coloured legs, only the bases of all femora being diffusely brown. The

inner outline of the hind tibia when viewed from below is distinctly undulated, thus differing from the figures here presented for related species. This male probably is correctly identified.

Clypeus not carinate down the middle, lacking the longitudinal keel so well pronounced in most other species. In the original description of *fletcheri* this bee is said to be less robust than *magrettii*, with black femora and dark apex of abdomen. The first statement I am unable to confirm, while the only point of distinction between the two relates to body colour, which, as I have shown for *impatiens*, in this group varies greatly between individuals when good series can be compared. The gastral tergites in all males of either *magrettii* and *fletcheri* are dull black with faint blue and purplish reflections, lacking "red" areas, only the hind margins of the segments being broadly testaceous, as they are also in the Chinese *E. percarinata* (Ckll.), which has, however, a sharply defined clypeal keel. In general appearance and venation these bees are quite similar to *E. moelleri* and other members here united, but the male sternites and genital organs of the types could not be investigated; further material of the present species from the same country is therefore needed to decide on the relationship of these closely similar bees. I have no doubt that *magrettii* and *fletcheri* are conspecific.

Distribution. — Northern India and ? Assam.

Elaphropoda khasiana (Schulz, 1906) comb. nov.

- 1904. CAMERON, Ann. Mag. Nat. Hist. (7) 13 : 211—212 (pars: ♀ only!). — ♀ Khasia Hills (*Habropoda fulvipes* sp. n.).
- 1906. SCHULZ, Spolia hymenopt.: 253 (*Anthophora khasianus* nom. nov. for *Habropoda fulvipes* Cam., not *Anthophora fulvipes* Eversm.).
- 1920. COCKERELL, Ann. Mag. Nat. Hist. (9) 6 : 202 (descr.). — ♂ Khasia Hills (*Habropoda fulvipes* Cam.).
- 1922. COCKERELL, Ibid. (9) 9 : 248 (note) (*Habropoda fulvipes* Cam.).
- 1927. COCKERELL, Ibid. (9) 20 : 530—531 (add. notes on ♂) (*H. fulvipes* Cam.).

Material. — Assam: ♀ (lectotype), labelled "Khasia", ROTHNEY coll., in the University Museum, Oxford.

This bee is a true *Elaphropoda*, conforming in every respect to the diagnosis of that genus. COCKERELL (1922) already pointed out that CAMERON's male of *fulvipes* does not belong here but is a halictine (*Thrinchostoma* spec., possibly *sladeni* Ckll., 1913), CAMERON having been led astray by comparing his specimen with BINGHAM's picture of the male of *E. magrettii* (Bingham), a totally different bee; and by wrongly associating the sexes he naturally considered his female to represent a new species. In an earlier paper COCKERELL (1920) refers to a (topotypical!) male from the Khasia Hills he received from Mr. SLADEN, which he characterizes as follows: "... the face below the antennae is entirely rich chrome-yellow and the clypeus is carinated. The scape is yellow in front. The abdomen has the first two segments red". I have not seen this specimen, but since the last-mentioned brief description applies to any other species of the group except *magrettii* (which has no clypeal keel), its identity must remain doubtful. It may be conspecific with *E. moelleri* (Bingham), described from a male, but as long

as no direct comparisons can be made of the structural features of these bees, nothing definite can be said.

Distribution. — Assam and ? Siam.

Although SCHULZ wrongly considered *Anthophora fulvipes* Eversmann, 1846, and *Habropoda fulvipes* Cameron, 1904, to be congeneric, we have to accept the substitute name *khasiana* Schulz for this species, *fulvipes* Cameron being a junior secondary homonym of *fulvipes* Eversmann.

***Elaphropoda moelleri* (Bingham, 1897) comb. nov.**

1897. BINGHAM, Fauna Brit. India, Hym. 1 : 522 (key), 523. — ♂ Native Sikkim (*Habropoda moelleri*, n. sp.).

Material. — ♂ (holotype, no. 636), bearing BINGHAM's locality label, in the British Museum collection. It may well have been taken in the Darjeeling district (eastern Himalayas), east of Nepal. A second ♂ (Münich museum), now before me, is labelled "Sikkim/Waagen/46" and "Habropoda moelleri Bingh. det. E. Clément".

The present ♂ agrees well with the type and original description, except that only the first gastral segment is entirely "red", the disk of the succeeding segments of the abdomen being obscured, exactly as in *magrettii* and dark individuals, males as well as females, among our series of *E. impatiens* from Sumatra and the Malay

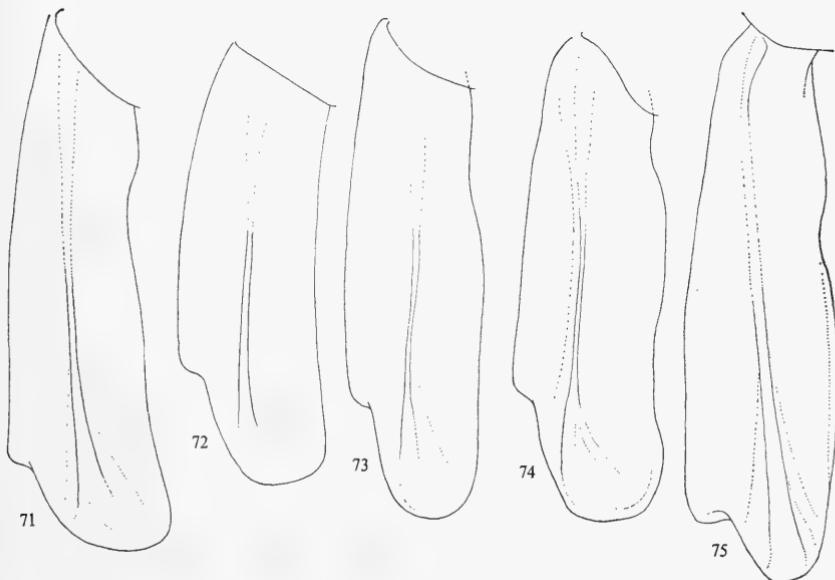


Fig. 71—75. *Elaphropoda* species, horizontal interior view of right hind tibia; fig. 71, *E. moelleri* (Bingham), Sikkim; fig. 72, *E.?* *impatiens* (Lieft.), Lower Burma; fig. 73, *E. impatiens* (Lieft.), Fraser's Hill, Malaya; fig. 74, *E. impatiens* (Lieft.), paratype, Mt. Tanggamus, S. Sumatra; fig. 75, *E. percarinata* (Ckll.), Tachulan, Fukien. All figures drawn to the same scale

Peninsula. Here again we meet with colour differences which are obviously of no use for specific discrimination.

Whole anterior surface of head, including labrum and most of the mandibles, honey yellow, except a pair of dark ferruginous hair-lines running from the transverse clypeal suture down along subantennal grooves to tentorial pits; yellow lateral face marks extending upward along eye-margin to upper margin of antennal sockets. Supraclypeal mark triangular, $2\frac{1}{2}$ times broader than high, surface on top of this mark slightly raised, forming a low tubercle. Anterior face of antennal scape honey yellow, tawny behind; pedicel dark brown; flagellum ochraceous tawny, apical portion of first and basal part of second flagellar segments lighter. Hind leg (except coxa and trochanter) entirely pale, basitarsus not obscured.

Terminalia very similar to those of the allied species, as in fig. 76—77 (the 7th sternite was damaged and lost).

The following additional features, taken from the single male now before me, may or may not be of specific value as they would seem to apply to most, if not all, species examined.

Labrum widest about half-way its length, only little longer than wide (43 : 40). Length and basal width ratio of clypeus 50 : 32. Clypeocellar distance shorter than length of clypeus (40 : 55). Anterior length ratios of first four flagellar segments of antennae 13 : 5 : 10 : 10. Hind tibia about twice as long as its width at apex, measured along inner margin; inner aspect of hind tibia, see fig. 71.

Were it not for the strongly developed clypeal keel, *moelleri* would come very near *magrettii*, but on the strength of this important character, I prefer to keep the species apart.

Elaphropoda impatiens (Lieftinck, 1944) comb. nov.

1944. LIEFTINCK, Treubia, hors sér.: 80—91, pl. 42 fig. 5—7 (♂ ♀ ins. phot.) fig. 23—31 (♂ struct.). — ♂ ♀ Sumatra (*Habropoda*).
 ?1927. COCKERELL, Ann. Mag. Nat. Hist. (9) 20 : 531 (record only). — ♀ Peninsular Siam (*Habropoda fulvipes* Cam.).

Additional material. — **S u m a t r a** : series ♂ ♀, NE Sumatra, Deli, Berastagi, foot of Mt. Sinabung, 1400 m, 7—14.XI.1950, in dense forest, on flowers of *Impatiens* sp., M. A. LIEFTINCK; ♀, NE Sumatra, Deli, Sibolangit forest reserve, 450 m, 16.XI.1950, same collector; ♀, W Sumatra, Kerintji, Muara Sako, X.1915, EDW. JACOBSON. — **M a l a y P e n i n s u l a** : ♀, Negeri Sembilan, Gunong Angsi, 2000—2790 ft., IV.1918; ♂, Selangor, Bukit Kutu, 3300 ft., IX.1932; 3 ♀, Perak, Larut Hills, 4000—4500 ft., II.1932; 2 ♀, Pahang, Fraser's Hill, 4200—4600 ft., X.1933 & V.1936; ♀, Pahang, Cameron's Highlands, 5000 ft., VI.1935; all H. M. PENDLEBURY. — **T h a i l a n d** : ♂, Chiengmai, Doi Suthep, 900 m, 14.XI.1957, J. L. GRESSITT, Bishop Mus. — **B u r m a** : ♀, Lower Burma, S Shan States, Road 40 km E of Taunggyi, 25.IX—13.X.1934, R. MA LAISE, Mus. Stockholm.

There is almost complete agreement between the type series and the additional examples from NE Sumatra and the Malay Peninsula, the latter exhibiting the

same amount of variation in the abdominal colour pattern. This was described by me earlier and need not be repeated here. In fig. 23 of the original description the face marks of the male are incorrectly shown to extend inward behind the antennal sockets. This is due to the fact that the similarly coloured dense hair tufts on both sides of the frons were mistaken for integumental spots; in reality the paraclypeal area is coloured exactly as in *E. bembidion* sp. n., as shown in fig. 4 of the present paper. It will be seen, however, that the latter differs from

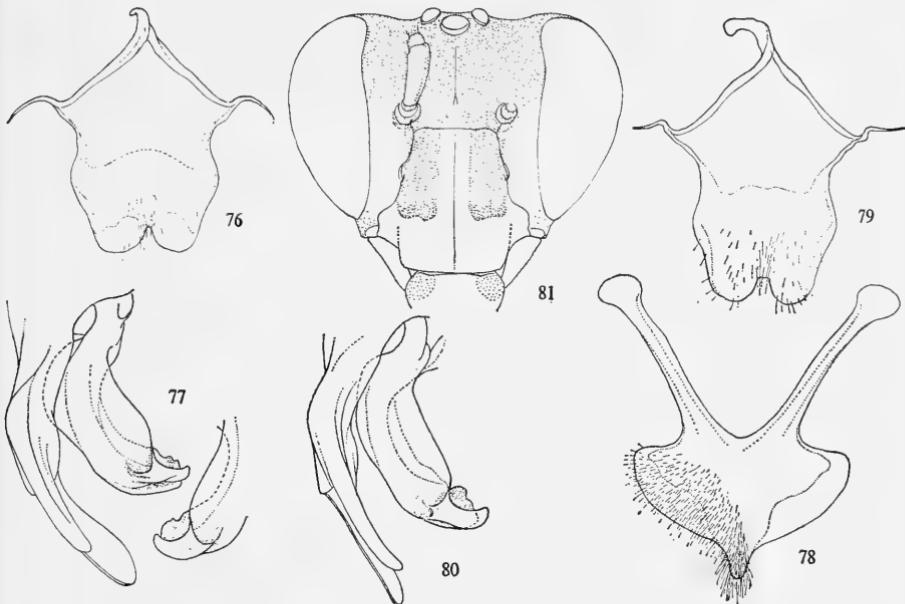


Fig. 76—81. Structural details of *Elaphropoda* males; fig. 76—77, *E. moelleri* (Bingham), eighth sternite (76), exterior view, and right gonoforceps and volsella (77), partial ventral view; fig. 78—80, *E. ? impatiens* (Lieft.), Lower Burma, seventh sternite (78), eighth sternite (79), exterior view, and right gonoforceps and volsella (80), partial ventral view; fig. 81, *E. bembidion* sp. n., holotype, Mt. Kinabalu, N Borneo, frontal view of head. Vestiture in fig. 77 and 80 omitted

impatiens by having a pair of conspicuous dark blotches on the clypeus (fig. 81). The supraclypeal mark in both sexes of *impatiens* is invariably shaped like a broad triangle, as correctly indicated in fig. 23 of the earlier paper. Despite the very close similarity in general appearance, colour and pubescent pattern, the specimens from Burma, Malaya and Sumatra are not quite alike with respect to certain structural proportions. The clypeocellar distance and length of clypeus are in the ratio of 40 : 50 (Burma and Malaya), as against 40 : 55.6 (Sumatra); the length and basal width of the clypeus and median interorbital width are in the ratios of 50 : 32 : 60 (Malaya and Sumatra) and 50 : 32 : 56 (Burma). Slight differences were also noted in the configuration of the hind tibiae as seen from beneath (fig. 72—74), but when viewed from the side the shapes and proportions were found to be nearly identical.

The Burmese male is a worn specimen whose coloured pubescence has lost much of its freshness. In this specimen the first gastral segment and a pair of transverse spots (one on either side) at the base of the second, are "red", the hind margins of 2—6 being broadly bordered with ochraceous, thus differing from the others in which these segments are only narrowly light-bordered. Now COCKERELL (1927) records *E. khasiana* (Schulz) from Peninsular Siam, so that the present male may belong to that species rather than *impatiens*? Its tibia is shown in fig. 72, the terminalia in fig. 78—80.

Distribution. — Sumatra and the Malay Peninsula (universal); ? Lower Burma.

Remarks. — I came across this elusive species again in northern Sumatra under circumstances almost identical to those during my collecting trip in 1939 and 1940 to south Sumatra. I wrote about these as follows: "On Mt. Tanggamoe *H. impatiens* was strictly confined in its visits to one particular kind of flower, viz. a wild Balsam, *Impatiens* cf. *oncidoides*, with large yellow flowers carrying long curved spurs. Patches of this hygrophilous plant were found in damp shady situations, chiefly in trenches and other gloomy places beside the long-abandoned track on the edge of the dense virgin forest. Once arrived there, we were soon struck by the shrill note of *impatiens* which flashed hither and thither among the low herbage. The males kept up a continual flight over the flowers which only the females searched for honey and pollen; the males greatly outnumbered the females and alighted only rarely in sunlit openings, on leaves and tiny branches; they were exceedingly alert and difficult to capture when ranging over the flowers in search of the females. Curiously enough, the insects were most abundant when the weather was dull and were active even when it was raining. Although common in this restricted habitat and possibly breeding gregariously, we have been unable to find the nests. *H. impatiens* is probably the host of *Calloomelecta vulpecula*, which was captured in the same locality and on the same days." (LIEFTINCK, 1944 : 90—91).

Elaphropoda erratica (Lieftinck, 1944) comb. nov.

1944. LIEFTINCK, Treubia, hors sér.: 91—93, pl. 42 fig. 8 (♀ ins. phot.). — ♀ West Java (*Habropoda*).

Additional material. — Java: ♀, W Java, Mt. Pangrango, southern slope, 1200 m, 7.VIII.1949, on flower of *Impatiens platypetala* in humid forest, M. A. LIEFTINCK.

This is the second known example of a very rare species. It is exactly identical with the type. Unfortunately the male has remained unknown, but it should be easily distinguished from *impatiens* by its smaller size and different face marks.

Elaphropoda bembidion sp. n.

Material. — Borneo: ♂ (diss.), N Borneo (Sabah), Mt. Kinabalu, Kenokok, 3300 ft., 29.IV.1929, H. M. PENDLEBURY. Holotype ex F. M. S. Mus., in the British Museum (Nat. Hist.).

Characters as for genus. Closely resembling dark individuals of *E. impatiens*

(Lieft.), but differing in details of coloration, armature of legs and abdominal terminalia, as follows.

Male. — Mouth-parts, greater part of face and scape of antenna anteriorly, deep chrome, the malar space, teeth and apex of mandible, dark ferruginous. Face marks, frons and antennae dark brown, only the distal portion of first flagellar segment of antenna red brown; orange supraclypeal mark high and narrow (fig. 81). Legs rufous, the coxae and trochanters hazel; outer face of hind femur slightly darker towards apex, the basitibial area and hind basitarsus dark brown. Wings more strongly tinged with yellow than in *E. impatiens*, but the neuration as in that species. Integument of gaster coloured as in the darkest individuals of *E. impatiens*, i.e. no "red" areas on basal segments; instead, the hind margins of all tergites are more broadly pale coloured (cinnamon-buff) than in *impatiens*, the apical bands occupying only little less than half of the exposed surface of segm. 1—5, the sternites on the contrary being predominantly dark brown. Body pubescence as in *E. impatiens*.

Structure. — Clypeocellar distance and length of clypeus in the ratio of 40 : 54.5; length and basal width ratio of clypeus 50 : 30; length ratios of first four flagellar segments of antenna, 12 : 6 : 10 : 10. Clypeal keel well developed, similar to *E. impatiens*. Inferior keel of hind tibia more sharply pronounced than in *impatiens*, the apical lamella distinctly more drawn out in lateral view and narrower, the apex almost pointed when looked at from beneath (fig. 83). Length of body 15 mm approx., length of fore wing 11 mm.

Frontal view of head as in fig. 81; mandible, fig. 82. Terminalia very similar to those of the allied species (fig. 84—86).

Immediately distinguished from its allies by the well-developed dark brown clypeal marks, which in the males of all other described species are reduced to narrow dark stripes, often mere hair lines extending along the subantennal suture as far as the anterior tentorial pits, the clypeus itself remaining unmarked. The species is also remarkable for its darker wings, which are deeply stained with yellow. The female remains unknown.

Distribution. — Borneo.

Elaphropoda percarinata (Cockerell, 1930) comb. nov.

1930. COCKERELL, Ann. Mag. Nat. Hist. (10) 6 : 51—52. — ♂ Foochow, China (*Habropoda*).

Material. — China: ♂ (holotype, no. 644), SE China, Fukien, Foochow district, KELLOGG, in the British Museum (Nat. Hist.). — 2 ♂ (diss.) ♀, SE China, Fukien, Shaowu, Tachulan, 8—17.VIII, 8—14.IX.1943 and 27.VII.1947; ♂ (diss.) ♀, same area, Stat. 1, 1500 m, 3.VIII.1946; ♂ ♀, same area, Kuatun, Chungan, 1400 m, 4—6.VII.1945 and Sanchiang, Stat. 9, 14—1500 m, 11—12.VIII.1945; ♀, Fukien, Kienyang, Hwangkeng, Stat. 2, no date; all TSING-CHAO MAA.

The present specimens are referred here with some misgivings, the pubescence in all of them being rather paler than in the type and possibly discoloured. In

general they agree with the type but differ by having the greater part of the anterior face of the antennal scape definitely yellow, though the yellow area is not sharply defined. In the original description no mention has been made of the consistency of the long hairs covering the clypeus on either side, the latter being

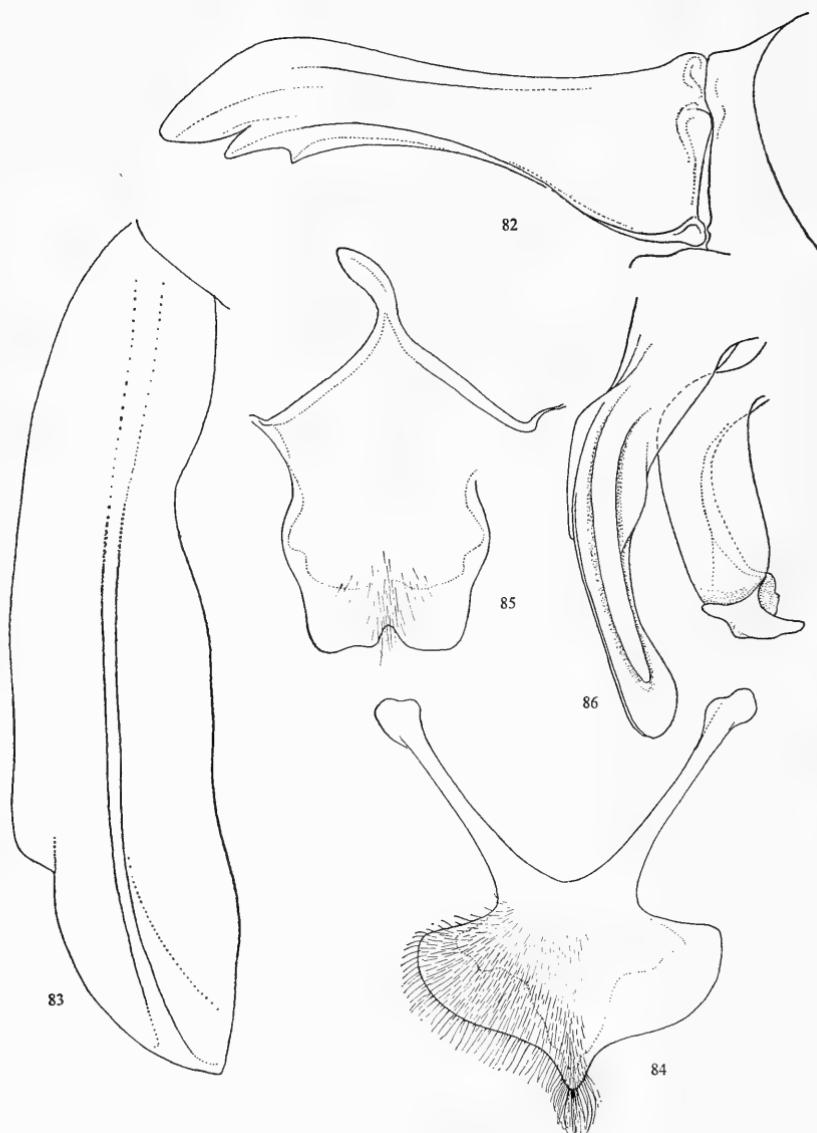


Fig. 82—86. *Elaphropoda bembidion* sp. n., holotype, Mt. Kinabalu, N Borneo; fig. 82, right mandible, exterior view (bristling omitted); fig. 83, right hind tibia, horizontal interior view; fig. 84 and 85, seventh (84) and eighth (85) sternites, exterior view; fig. 86, right gonoforceps and volsella, partial ventral view (vestiture omitted).

bristly, not abundant, brown on upper portion and becoming golden yellow anteriorly. The wings are exactly as described for *magrettii* and *impatiens*; the marginal cell in the type is erroneously described as "not greatly produced", it being in fact of the same great length as in all other species of *Elaphropoda*. The tarsi of the type are described as "black or nearly so", but I failed to notice any difference between our specimens and the type, in which they are ochraceous orange, only the basitarsus III being conspicuously dark brown, and the claws are tipped with black.

The abdomen in both sexes is blackish brown or black, the integument of the

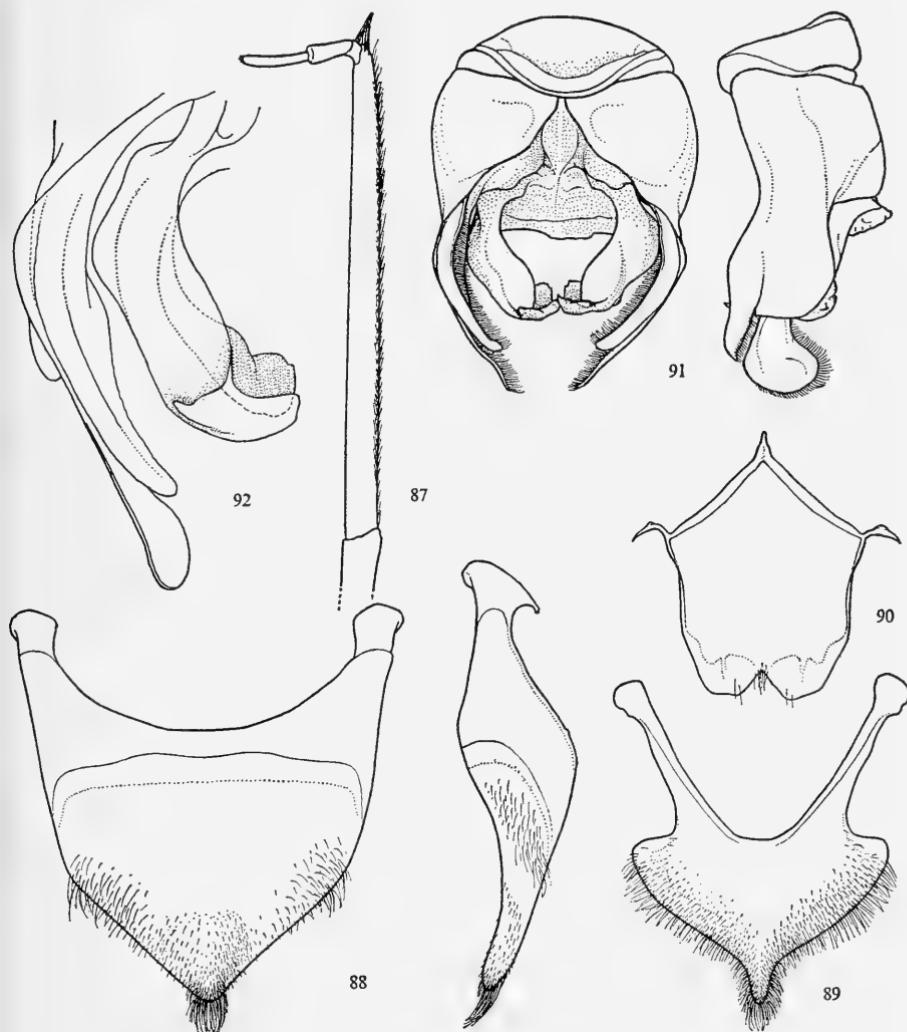


Fig. 87—92. *Elaphropoda percarinata* (Ckll.), Tachulan, Fukien; fig. 87, apical segments of labial palpus; fig. 88, sixth gastral sternite, exterior and profile view; fig. 89—90, seventh (89) and eighth (90) sternites, exterior view; fig. 91, genital capsule, ventral and left lateral view; fig. 92, right gono-forceps and volsella, partial ventral view (vestiture omitted).

posterior margins of the first five gastral segments being pale brownish yellow, those of the tergites broadly, of the sternites more narrowly so. There are no "red" areas on the first two tergites in any of the present series, males and females, which thus differ from the type. The thin short pubescence on the disk of the gastral tergites is more dense than in any of the other species described, but the integument still remains well visible under the tomentum.

Male characters. — Clypeus relatively long, clypeocellar distance and length of clypeus in the ratio 40 : 56.5; length and basal width ratio of clypeus 50 : 30; length ratios of first four flagellar segments of antenna, 12 : 5 : 10 : 10. Details of structure, taken from two males collected at Shaowu (Tachulan) are illustrated (fig. 75 and 87—92).

COCKERELL compares his specimen with *H. fulvipes* Cam. (= *khassiana* Schulz) and *magrettii*, with which the species is, indeed, very nearly related.

Distribution. — East China (Fukien).

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My sincere thanks are due to all entomologists who have assisted me in carrying out the present investigation, which is to be considered as a preliminary to further studies on a somewhat larger scale. It was started before I left Indonesia and is mainly based on material then received through the good offices of several correspondents abroad. Many of the illustrations were also prepared about that time, while others were supplemented only recently.

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MONOGRAPHIEËN VAN DE NEDERLANDSCHE ENTOMOLOGISCHE VEREENIGING

Deze worden met onregelmatige tussenpozen uitgegeven. Er zijn reeds verschenen:

- F. T. Valck Lucassen et al. — Monographie du genre Lomaptera Gory & Percheron (Coleoptera, Cetoniidae), prijs f 50.—.
- 1. A. J. Besseling. — De Nederlandse Watermijten (Hydrachnellae Latreille, 1802), prijs f 25.—.

BORNEAN FIG WASPS FROM *FICUS STUPENDA* MIQUEL (HYMENOPTERA, CHALCIDOIDEA)

BY

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ABSTRACT

The Agaonidae *Blastophaga* (*Waterstoniella*) *masii* Grandi, ♀ ♂, and *Blastophaga* (B.) *errata* spec. nov., ♀, reared from one and the same receptacle of *Ficus stupenda* Miq., are described together with other fig wasps from the same sample, viz. Agaonidae: *Ceratosolen* spec. near *C. notus* (Baker), ♂ (contamination of the sample?); Sycophagine Torymidae: *Arachonia borneensis* spec. nov., ♀, *Sycoryctes billi* spec. nov., ♀ ♂, *Sycoscapter reticulatus* spec. nov., ♀ ♂ (including a possibly conspecific, giant male), *Sycoscapteridea stilifera* spec. nov., ♀, *Grandiana corneliae* spec. nov., ♀ ♂.

INTRODUCTION

One of the moot points in the hypothesis of specificity of figs and fig wasps, is the question whether two species of Agaonidae can live in one species of *Ficus*.

WILLIAMS (1928: 9—10) tried *Blastophaga* (*Eupristina*) *bakeri* (Grandi), the symbiont of *Ficus forstenii* Miq., on young figs of *Ficus microcarpa* Linn. f., and *Ceratosolen notus* (Baker) from *Ficus nota* (Blanco) Merr., on *Ficus botryocarpa* Miq. It appeared that the wasps entered the foreign receptacles and, in the latter instance, oviposited in the gall flowers.

JOSEPH (1953a: 282; 1954: 409) recorded two specimens of Agaonidae from one species of *Ficus*, viz. *Ceratosolen fusciceps* (Mayr) and *Blastophaga* (*Eupristina*) *belgaumensis* (Joseph) from *Ficus drupacea* Thunb. var. *pubescens* (Roth) Corner. I suggested (WIEBES, 1963: 98) that these records might be due to confusion of the figs of the strangler *Ficus* with those of its host *Ficus*, either by the collector or by the wasps.

Figs of *Ficus stupenda* Miq., collected by E. J. H. CORNER in Borneo, attracted attention because of the many kinds of insect emerging (CORNER, 1964: 38). The insect fauna of these receptacles is described in the present paper, some Chalcidoidea not belonging to the Agaonidae nor to the Sycophagine Torymidae excepted.

HOST RECORDS FROM *Ficus stupenda* AND RELATED FIGS

A survey of the Agaonidae and Sycophagine Torymidae (Sycophilini excluded) from *Ficus stupenda* and related figs of subsection *Conosycea* (Miq.) Corner, is given in Table I. *Ficus arnottiana* Miq. (with *Blastophaga* (B.) *arnottiana* Joseph, and *Terastiozoon incompletum* Joseph), *Ficus chrysolepis* Miq. (with *Blastophaga* sp. near "Ceratosolen" *megarhopalus* Grandi), *Ficus crassiramea* Miq. (with

Table I. Some host records, Agaonidae and Sycophagine Torymidae (Sycophilini excluded)

	<i>Ficus drupacea</i> Thunb.	<i>Ficus benghalensis</i> L. ¹⁾	<i>Ficus stupenda</i> Miq.
Agaonidae	<i>Blastophaga</i> (<i>Eupristina</i>) <i>belgaumensis</i> (Joseph)	<i>Blastophaga</i> (<i>Eupristina</i>) <i>matoni</i> (Saunders)	<i>Blastophaga</i> (<i>Waterstoniella</i>) <i>masii</i> Grandi
	<i>Ceratosolen fusciceps</i> (Mayr)		<i>Blastophaga</i> (B.) <i>errata</i> spec. nov. <i>Ceratosolen</i> spec.
Sycophagini	<i>Pterkoebelia thalakudienis</i> Joseph		
Philotrypini	<i>Philotrypesis longispinosa</i> Joseph	<i>Philotrypesis transiens</i> (Walker) <i>Philotrypesis travancoricus</i> Joseph <i>Sycoscapella affinis</i> Westwood	<i>Arachonia borneensis</i> spec. nov. <i>Sycoryctes billi</i> spec. nov. <i>Sycotrypesis reticulans</i> spec. nov. <i>Sycoscapella stiliifera</i> spec. nov.
Sycoryctini	<i>Arachonia plumosa</i> Joseph <i>Sycoscapler triformis</i> Joseph	<i>Sycoscapler insignis</i> Saunders	
Otiesellini	<i>Sycobiella clavata</i> Joseph	<i>Sycobiella saundersii</i> Westwood <i>Teratitiozon keraleensis</i> Joseph <i>Walkerella temeraria</i> Westwood	<i>Grandiana corneliae</i> spec. nov.

¹⁾ Some forms of dubious standing omitted.

Blastophaga (Waterstoniella) jacobsoni Grandi), and *Ficus forstenii* Miq. (with *Blastophaga (Eupristina) bakeri* (Grandi)), are not included in this table.

I have the impression that the following species do not belong to the regular fauna of the figs listed:

Ceratosolen fusciceps (Mayr), known as the symbiont of *Ficus racemosa* L.; *Blastophaga errata* spec. nov.;

Ceratosolen spec., close to *C. notus* (Baker) from *Ficus nota* (Blanco) Merr.;

Parakoebelea thalakvadiensis Joseph; the other species of this genus, *P. stratheni* Joseph, is known from *Ficus racemosa* L.

The *Philotrypini*, *Sycoryctini* and *Otiesellini* are abundant throughout the subgenus *Urostigma* (Gasp.) Miq.

Philotrypesis transiens (Walker), *P. travancoricus* Joseph and *Sycoscaptella affinis* Westwood may actually be only one and the same species of *Philotrypesis*. *Terastiozoon keralensis* Joseph seems to be identical with *Walkerella temeraria* Westwood. Redescriptions of these species will be presented in a separate paper.

The fact is now unambiguously established, that more than one species of Agaonidae can reproduce in the receptacles of one fig. The data suggest that there are some *Sycophaginae* too, that can develop in a fig specifically or even subgenerically distinct from their normal host. I feel that this conclusion, although it does not affect the general hypothesis of host specificity, should warn against too strict appliance of the principle in special instances.

AGAONIDAE FROM *Ficus stupenda*

A preliminary report on the pollinating insects from *Ficus stupenda* was presented to the XIIth International Congress of Entomology (WIEBES, 1965).

The Agaonid wasps reared from *Ficus stupenda* belong to *Blastophaga (Waterstoniella) masii* Grandi, *Blastophaga (B.) errata* spec. nov., and *Ceratosolen* spec. near *C. notus* (Baker). I am not sure that the *Ceratosolen* are not a contamination of the sample.

Galls situated side by side in the same receptacle, contained nymphs of *B. errata* and *B. masii*, respectively. This not only means that the females of these two species of Agaonidae entered the same young receptacle, but also that they oviposited, and that a new generation of both (females and males of *B. masii*, females only of *B. errata*) developed in one and the same fig.

Blastophaga (Waterstoniella) masii is the second species of the subgenus to become known in the male sex. The description of this male allows for a better evaluation of the relationship of the group.

Blastophaga (Waterstoniella) masii Grandi (Fig. 1—7)

Blastophaga (Waterstoniella) masii Grandi, 1921, Ann. Mus. Stor. nat. Genova 49 : 306 (descr. ♀ in key, Engano); Grandi, 1922, Boll. Lab. Zool. Portici 15 : 213—215, fig. IV (descr. ♀, Bua-Bua, Engano, leg. E. Modigliani, 5.VI.1891); Grandi, 1924, Boll. Lab. Zool. Portici 18 : 11—12, fig. IV 3—4 (add. descr. ♀, Fort de Kock, Sumatra, leg. E. Jacobson,

I.1923); Grandi, 1932, Verh. Kon. natuurhist. Mus. België, buiten reeks 4 (5): 5 (♀, Samarinda, Borneo, 8.II.1929).

Waterstoniella spec.; Wiebes, 1965, Proc. XIIth Int. Congr. Ent., London 1964: 95 (ex *Ficus stupenda* Miq., North Borneo, leg. E. J. H. Corner).

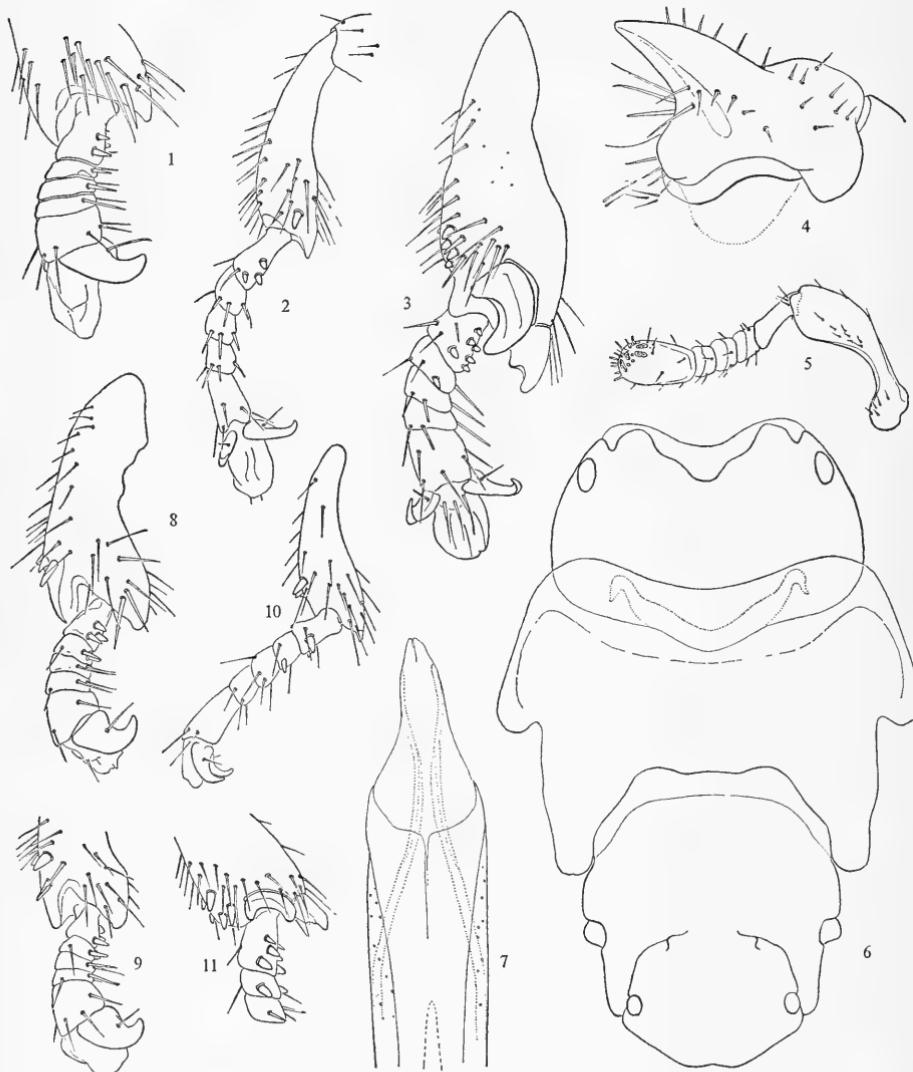


Fig. 1—7. *Blastophaga (Waterstoniella) masii* Grandi, male. 1, apex of fore tibia, and tarsus, axial aspect; 2, mid tibia and tarsus, antiaxial aspect; 3, hind tibia and tarsus, antiaxial aspect; 4, left mandible and hypostomal margin, ventral aspect; 5, left antenna, dorsal aspect; 6, head and thorax, dorsal aspect (pubescence omitted); 7, outline of penis, dorsal aspect. — Fig. 8—11. *Blastophaga (Waterstoniella) jacobsoni* Grandi, male. 8, fore tibia and tarsus, axial aspect; 9, do., specimen from type lot; 10, mid tibia and tarsus, antiaxial aspect; 11, apex of hind tibia, and three tarsal segments, antiaxial aspect. — Fig. 1—5, 7—11, $\times 165$

6, $\times 65$

Material. — Series ♀, ♂, coll. Mus. Leiden, no. 715; Sungai Liwagu, North Borneo, 4000 ft., ex *Ficus stupenda* Miq. (leg. et det. E. J. H. CORNER, RSNB no. 2845); ♀, slides nos. 715a, b, ♂, slides nos. 715c-e.

Male. — Reference is made to *Blastophaga (Waterstoniella) jacobsoni* Grandi, the only male of the subgenus hitherto known. Dr. GRANDI sent to me some specimens from the type lot of *B. jacobsoni* (Fig. 9), for comparison with the present material of *B. masii*. Most drawings of *B. jacobsoni* (Fig. 8, 10—11), however, were made from another sample (coll. Mus. Leiden, no. 323) from the type locality (Bot. Gdn., Bogor, Java, ex *Ficus crassiramea* Miq., leg. J. VAN DER VECHT, 5.IV.1955).

B. masii is somewhat variable, particularly in the chaetotaxy of the legs. The same appears to apply to *B. jacobsoni*; cf. its description by GRANDI (1917: 27—32, Fig. IX-X).

Head (Fig. 6) depress, transverse, nearly twice as wide as long, with scattered small hairs. Eyes relatively small. Mandible (Fig. 4) large, other mouth parts atrophied; a variable number of hairs occur next to the oral aperture. Antenna (Fig. 5) much like that of *B. jacobsoni*, but the flagellar segments relatively longer; the club entire.

Thorax (Fig. 6) large and wide, depress, with scattered small hairs. Pronotum with anterior and lateral expansions, as in males of *Eupristina* Saunders; the mesonotum approximately twice as wide as its median length, with posterior parts next to the propodeum; the metanotum visible in dorsal aspect as two lateral sclerites. Propodeum almost completely separate, nearly as long as wide, the spiracular peritremata almost circular, lateral in position. Prosternum short and wide, the prothoracic episterna large. Fore leg, Fig. 1. The dorsal tibial spines, found in all specimens of *B. jacobsoni* studied (Fig. 8—9), lacking; apical armature of the tibia as in *B. jacobsoni*. First tarsal segment with conical spines in variable number, other segments with normal spines. In *B. jacobsoni*, also the second tarsal segment (Fig. 8) and in some instances the third (Fig. 9), bear conical spines; the number is variable, even in both legs of one specimen. Tarsal segments approximately in ratio 4 : 1 : 1 : 1 : 2. Mid leg, Fig. 2. The dorsal margin of the tibia without conical spines (present in *B. jacobsoni*, Fig. 10; although the number is variable); the ventral angle produced, with one axial conical spine, and one antiaxial. The tarsus with conical spines on the first segment only (in *B. jacobsoni* also on the second, and sometimes on the third); the segments approximately in ratio 10 : 5 : 5 : 5 : 8. Hind leg, Fig. 3. In comparison with *B. jacobsoni* (Fig. 11), the dorso-apical conical spines of the tibia are relatively smaller and more concealed by the pubescence; the bidental apical crest is more robust, the teeth being unequal; the dorso-apical angle is distinctly produced. The ventral conical spines on the first tarsal segment are again smaller than in *B. jacobsoni*; the second segment bears only one cone, while the axial side has a robust spine instead; the segments are more transverse, approximately in ratio 5 : 1 : 1 : 1 : 5.

Gaster. Penis, Fig. 7.

Length (head and thorax), 1.5—1.6 mm. Colour olive-brown.

Remark. — At first sight the male of *B. masii* reminds one of a species of *Eupristina*, but a closer examination reveals its true subgeneric position. The characters of the head, antennae and thorax, similar to those of *B. jacobsoni*, confirm *Waterstoniella* Grandi as a distinct group in *Blastophaga* Gravenhorst. It appears to be close to *Eupristina* Saunders, which relation is better depicted in the new classification of *Eupristina* as another subgenus of *Blastophaga* (WIEBES, 1963: 100; GRANDI, 1963: 334), instead of as a distinct genus.

Blastophaga (Blastophaga) errata spec. nov.
(Fig. 12—20)

Ceratosolen spec. (part.); Wiebes, 1965, Proc. XIIth Int. Congr. Ent., London 1964: 95 (ex *Ficus stupenda* Miq., North Borneo, leg. E. J. H. Corner).

Material. — Series ♀, coll. Mus. Leiden, no. 778; Sungai Liwagu, North Borneo, 4000 ft., ex *Ficus stupenda* Miq. (leg. et det. E. J. H. CORNER, RSNB no. 2845); ♀ holotype, slide no. 778a, ♀ paratype, slide no. 778b.

Female. — Head (Fig. 18) about as long as wide across the compound eyes; the short pubescence becomes longer towards the cheeks. Facial groove rather narrow. The cheek nearly one and a half times as long as the longitudinal diameter of a compound eye. Three ocelli. Epistomal margin trilobate, the lateral lobes not prominent. Mandible (Fig. 16) with 13 ventral ridges, its appendage with nine lamellae. Labium and maxillae (Fig. 14) with two long, apical hairs each. Antenna (Fig. 13) with eleven free segments, the last three of which are shaped so as to form a club; the scape twice as long as its maximum width, with a prominent ridge on the antiaxial disc, the dorsal and ventral margins hirsute; the pedicel short, with a few axial spines only; the third segment small, its appendage (Fig. 12) wide and blunt, reaching halfway the fifth segment; the fourth segment small, with apical hairs; the fifth and sixth little longer than the fourth but distinctly wider, with apical hairs and one row of large, oblong sensilla; the seventh to ninth segments with more hairs, and with two rows of sensilla each (more regularly spaced at the axial side than at the antiaxial); the tenth segment shorter than the seventh to ninth, and about as long as the sixth although much wider, with one irregular row of oblong sensilla (forming two nearly complete rows at the axial side) and many circular pits; the ultimate segment shortest, with oblong sensilla and many blunt, sensillar hairs. The characters of the antenna appear to be rather variable in the present series. The club may consist of only two, subequal, distinct segments (numbers 9 and 10), and the number of sensilla may be larger, especially on the axial side.

Thorax almost glabrous. Pronotum rather short; the dorsal disc with small hairs in the posterior corners, the lateral parts with more, longer hairs. Scutum somewhat wider than long, subglabrous, some six short hairs occur along the postero-lateral margins only, the parapsides with some hairs; the scutellum as long as wide, with approximately 25 short hairs; the metanotum glabrous except for approximately seven lateral hairs towards each lateral margin. Propodeum not very long, with five hairs before, and many more, longer hairs behind the

spiracular peritremata; some more, smaller hairs occur along the posterior margin. Wings with many microtrichiae and few longer hairs. Fore wing (5 : 2), 2.0 mm long; the submarginal, marginal, stigmal, and postmarginal veins in ratio 26 : 8 : 5 : 8, the submarginal and stigmal both with three pustules; the fringe rather short. Hind wing (7 : 2), 1.1 mm long; the fringe longer. Fore leg (Fig. 15): the coxa half as long as the femur, with some hairs on the axial and anti-axial surfaces; the femur more than twice as long as the tibia including the dorsal

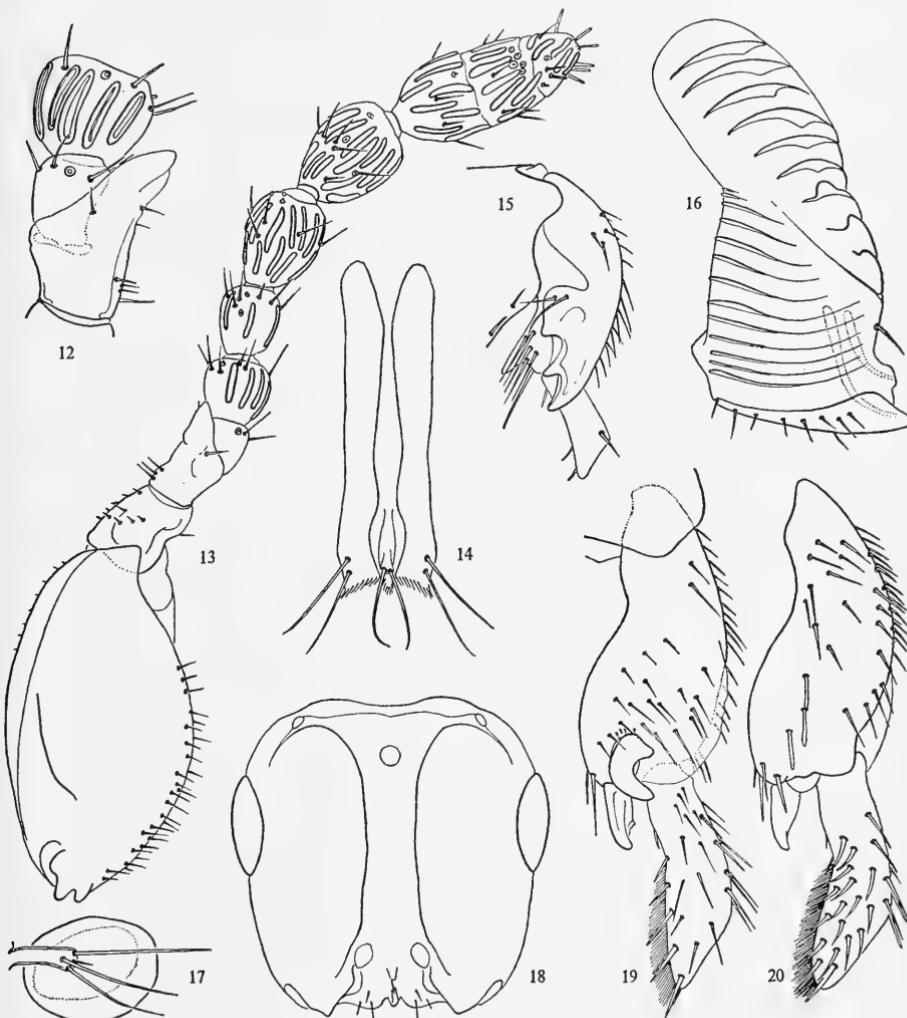


Fig. 12—20. *Blastophaga (B.) errata* spec. nov., female holotype. 12, antenna, detail in antiaxial view; 13, antenna, antiaxial aspect; 14, labium and maxillae, ventral aspect; 15, fore tibia and metatarsus, antiaxial aspect; 16, mandible, ventral aspect; 17, pygostyle, and outline of spiraculum of eighth urotergite; 18, head, frontal aspect (pubescence omitted); 19—20, hind tibia and metatarsus, 19, antiaxial aspect, 20, axial aspect. — Fig. 12, \times 250; 13—17, 19—20, \times 165; 18, \times 65

armature, almost glabrous on the disc, with hairs along the dorsal and ventral margins and a patch of finer pubescence on the axial disc close to the ventral margin; the tibia with a comb of three dorsal teeth and one ventral, antiaxially with several long hairs near the ventral angle and a row of shorter hairs along the dorsal margin, axially with a tuft of heavy spines on the disc; the tarsal segments with a few antiaxial, apical spines, and many more axials (as figured for the hind leg, Fig. 19), the length ratio approximately as 8 : 2 : 3 : 3 : 8. Mid leg slender; the femur shorter than the tibia, hirsute along the dorsal and ventral margins; a few hairs on the posterior disc, the anterior disc subglabrous; the tibia almost straight, with scattered hairs and one ventral spine; the tarsal segments approximately in ratio 22 : 12 : 11 : 9 : 16, with hairs and apical spines. Hind leg (Fig. 19—20): the coxa a little smaller than the femur, with small axial spines, glabrous antiaxially; the femur hirsute along the ventral and dorsal margins, and with some smaller hairs on the dorsal part of the antiaxial disc; the tibia two-thirds of the length of the femur, with stout hairs along the dorsal margin and on the discs (some spine-like hairs on the axial disc are blunt, and differently shaped from the others), the apical edge bears a hyaline ridge at the dorsal side, and two teeth (the one simple, the other bidentate) at the ventral angle; the tarsus rather wide, with axial hairs and spines, antiaxial spines, and a ventral fringe on all segments, the length ratio approximately as 17 : 7 : 7 : 5 : 8.

Gaster. The segments with long hairs, particularly along the caudal margins. Stigmata of the eighth urotergite (Fig. 17) circular; pygostyles with four apical hairs, one of which is short. The ovipositor and the valves are nearly one and a half times as long as the gaster.

Length (head, thorax and gaster), 2.7 mm. Colour blackish brown, the antennae, distal segments of the legs (from the tibiae onwards), and the ventral surfaces lighter.

Remark. — *B. errata* is immediately recognized from the other species of *Blastophaga*, e.g. by the head, in which the sclerotized parts are large, and the facial furrow narrow.

The remarkable fact that the rather long series consists of females only, may be due to abnormal conditions in the presumably foreign, host species.

Ceratosolen spec. near **C. notus** (Baker)
(Fig. 21—30)

Ceratosolen spec. (part.); Wiebes, 1965, Proc. XIIth Int. Congr. Ent., London 1964 : 95 (ex *Ficus stupenda* Miq., North Borneo, leg. E. J. H. Corner).

Material. — 2 ♂, coll. Mus. Leiden, no. 716; Sungei Liwagu, North Borneo, 4000 ft., ex *Ficus stupenda* Miq. (leg. et det. E. J. H. CORNER, RSNB no. 2845); ♂, slide no. 716a.

Male. — Head (Fig. 23) one and a half times as long as its maximum width, with fine, scattered pubescence. Eyes absent. Epistomal margin trilobate, the

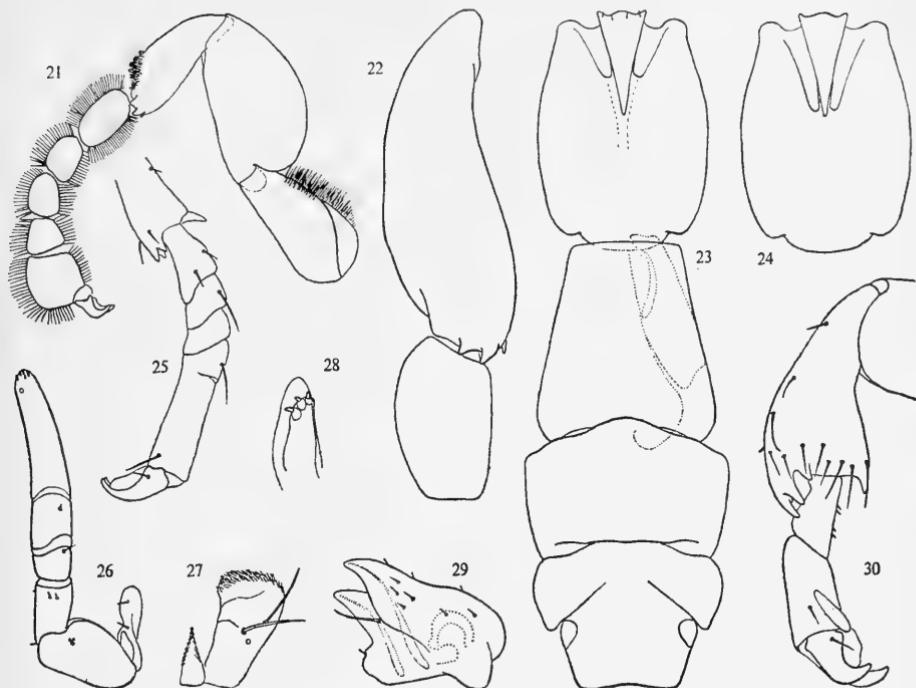


Fig. 21—30. *Ceratosolen* spec. near *C. notus* (Baker), male. 21—22, hind leg, 21, antiaxial aspect (semidiagrammatical), 22, detail enlarged; 23, head and thorax, dorsal aspect (pubescence omitted); 24, head of second specimen, dorsal aspect (pubescence omitted); 25, apex of mid tibia, and tarsus, antiaxial aspect; 26, antenna, ventral aspect; 27, labium and maxilla, ventral aspect; 28, genital armature; 29, mandible, ventral aspect; 30, fore tibia and tarsus, antiaxial aspect. — Fig. 21, 23—24, \times 65; 22, 25—26, 29—30, \times 165; 27—28, \times 250

median lobe wide, the lateral lobes more acute. Mandible (Fig. 29) bidentate. Maxilla (Fig. 27) not or scarcely expanded laterally, with two long hairs. Antennal grooves open, but not very long; this may be a variable character, as in the second specimen the grooves are relatively longer (Fig. 24). Antenna (Fig. 26) five-segmented; the scape (2 : 1) twice as long as the pedicel (4 : 3), and much wider; the first and second flagellar segments as wide as the pedicel, the second of the same length (in ventral aspect; much shorter in dorsal view), the first half as long; the ultimate segment tapering distad, little more than twice as long as the pedicel; hairs as in the figure.

Thorax (Fig. 23) glabrous. Pronotum approximately as long as wide posteriorly, narrower anteriorly; the mesonotum wide, its width nearly twice the length, with straight, slightly tapering, lateral edges; the metanotum straight, incompletely separate from the propodeum. Propodeum almost as long as its maximum width, the spiracular peritremata not very large, partly lateral in position. Fore leg (Fig. 30) rather slender, particularly the femur, which is more than twice the length of the tibia including the apical armature; the femur subglabrous; the tibia

with some long subapical hairs, four dorsal teeth (one of which is small), and three ventrals; the bimerous tarsus with four stout, axial hairs on the first segment, the segments approximately in ratio 7 : 6. Mid leg (Fig. 25): the coxa subequal in length to the femur; the tibia distinctly longer, slightly arcuate, with apical teeth, four of which are visible in posterior aspect; the tarsus pentamerous, oligomerous in one of the legs of the first specimen (Fig. 25), the segments approximately in ratio 5 : 3 : 2 : 2 : 8. Hind leg (Fig. 21) pubescent; the coxa with a dorsal hyaline ridge reaching half length, and heavy axial pubescence; the femur and tibia pubescent on the axial surfaces; the tibial armature (Fig. 22) inconspicuous, consisting of two antiaxial teeth, and one smaller, axial; the metatarsus nearly half as long as the tibia, the tarsal segments dilated and pubescent, their length ratio approximately as 10 : 7 : 7 : 6 : 8.

Gaster. Claspers (Fig. 28) of the genitalia with three claws; parameres present. Length (head and thorax), 1.4 mm. Colour uniform yellowish brown.

Remark. — In my key to the Indo-Australian species of *Ceratosolen* Mayr (WIEBES, 1963: 88—91), this *Ceratosolen* spec. runs to couplet 26, and appears to be rather close to *C. notus* (Baker). It differs in various characters, e.g. the pubescence of the head, the shape of the antennal grooves, the straight lateral edges of the maxillae; *C. notus*, moreover, is more robust and distinctly larger.

The find of the males of *Ceratosolen* spec. in the sample from *Ficus stupenda* led me to the record of 1965 (WIEBES, 1965: 95—96), but on closer examination the females taken from the galls situated side by side with those of *Blastophaga masii*, appear to belong to *Blastophaga errata*. The two males of *Ceratosolen* were found in the tube of insects accompanying the entire figs from which I took *Blastophaga masii*, *B. errata*, *Arachonia borneensis*, etc.; I could not find any more specimens of *Ceratosolen* in the figs.

More males and females of this *Ceratosolen* were collected by E. J. H. CORNER during the same expedition to Borneo, from figs of *Ficus* cf. *nota* (Blanco) Merr. (without number²), at Kota Belud, North Borneo, 23.IX.1961; coll. Mus. Leiden, nos. 630, 632. I refrain from naming the form until I have studied the rich collection of insects from *Ficus nota* and its allies, made during a recent trip to the Philippine Islands. The alliance of *Ceratosolen notus* contains some closely related forms, the status of which should be reconsidered now that more material is available.

SYCOPHAGINE TORYMIDAE FROM *Ficus stupenda*

Sycoryctini

Ovipositing organs of some of the female Sycoryctini from *Ficus stupenda* were figured by WIEBES (1966). In the same paper the Indo-Australian genera of the tribe were listed. A provisional key, mainly based on the criteria applied, though not explicitly stated, by JOSEPH (1957), may show the characters used for the generic distinction of the females.

²) CORNER (1962, in litt.) noted: "I am not sure that the Bornean plants are the same as the Philippine *F. nota*".

KEY TO SOME GENERA OF SYCORYCTINI

1. Fore wing with a number of large hairs in the margino-stigmal angle . . . 2
- Fore wing without such large hairs 3
2. Funicular segments of the antenna normal, almost symmetrical
. *Sycoscapter* Saunders
- Proximal funicular segments of the antenna dilated ventrad, distinctly asymmetrical *Arachonia* Joseph
3. Dorsal spine of the hind metatarsus very long, reaching beyond the second tarsal segment *Sycoryctes* Mayr
- Dorsal spine of the hind metatarsus shorter than the second tarsal segment *Sycoscapteridea* Ashmead

The association of the males proves to be difficult. The assignment of the male Sycoryctini found in the present sample, is argumented under their respective specific headings.

***Arachonia borneensis* spec. nov.**
(Fig. 31—42)

Arachonia spec.; Wiebes, 1966, Zool. Meded. 41: 153, fig. 3 (eighth and base of ninth urotergites figured).

Material. — 14 ♀, coll. Mus. Leiden, no. 717; Sungai Liwagu, North Borneo, 4000 ft., ex *Ficus stupenda* Miq. (leg. et det. E. J. H. CORNER, RSNB no. 2845); ♀ holotype, slide no. 717a, ♀ paratype, slide no. 717b.

Female. — Head (Fig. 42) slightly shorter than wide across the compound eyes, rather depress in lateral view; moderately pubescent except for the lighter parts (indicated in the figure by a dotted line), which are glabrous. Face with a shallow, wide groove running from the antennal toruli to the median ocellus. Eyes large, but not much protruding; the longitudinal diameter more than twice as long as the cheek. Three ocelli. Epistomal margin with one prominent lobe. Mandible (Fig. 32—33) bidentate, with two glands; both the dorsal and ventral surfaces with many long hairs. Maxillary palp (Fig. 35) four-segmented, the segments approximately in ratio 6 : 8 : 4 : 9, the second and third bear one long seta each, the ultimate segment bears two long hairs. Labial palp unisegmented in the holotype (Fig. 35), distinctly two-segmented in the paratype (Fig. 36); the chaetotaxy appears to be somewhat variable. Antenna (Fig. 41) with 12 free segments, the third and fourth of which are annuliform, the last three are shaped so as to form a club; the first four segments bear short hairs as in the figure, the fifth to twelfth with longer hairs; the scape four times as long as the pedicel, slightly flattened; the pedicel short, its maximum width not much less than its length (3 : 4); the first annulus slightly longer than the second; the third to fifth flagellar segments dilated ventrad, the sixth to tenth more symmetrical in outline; these segments gradually diminishing in size toward the tip of the antenna; each bears a rather regular row of 15 to 20 long sensilla.

Thoracic terga with a reticulate sculpturation, as indicated in Fig. 39. Pronotum rather wide and long, moderately pubescent; scutum not much longer than the

pronotum, with approximately 12 dorsal hairs, the parapsidal furrows obsolete in the posterior two-thirds; the parapsides with five hairs; the scutellum (Fig. 39) wider than long (5 : 4), with 12 or 13 hairs; declining in the posterior part; the metanotum very short, but as wide as the propodeum. Propodeum with the usual longitudinal ridges mediad of the circular spiracular peritremata; the lateral parts

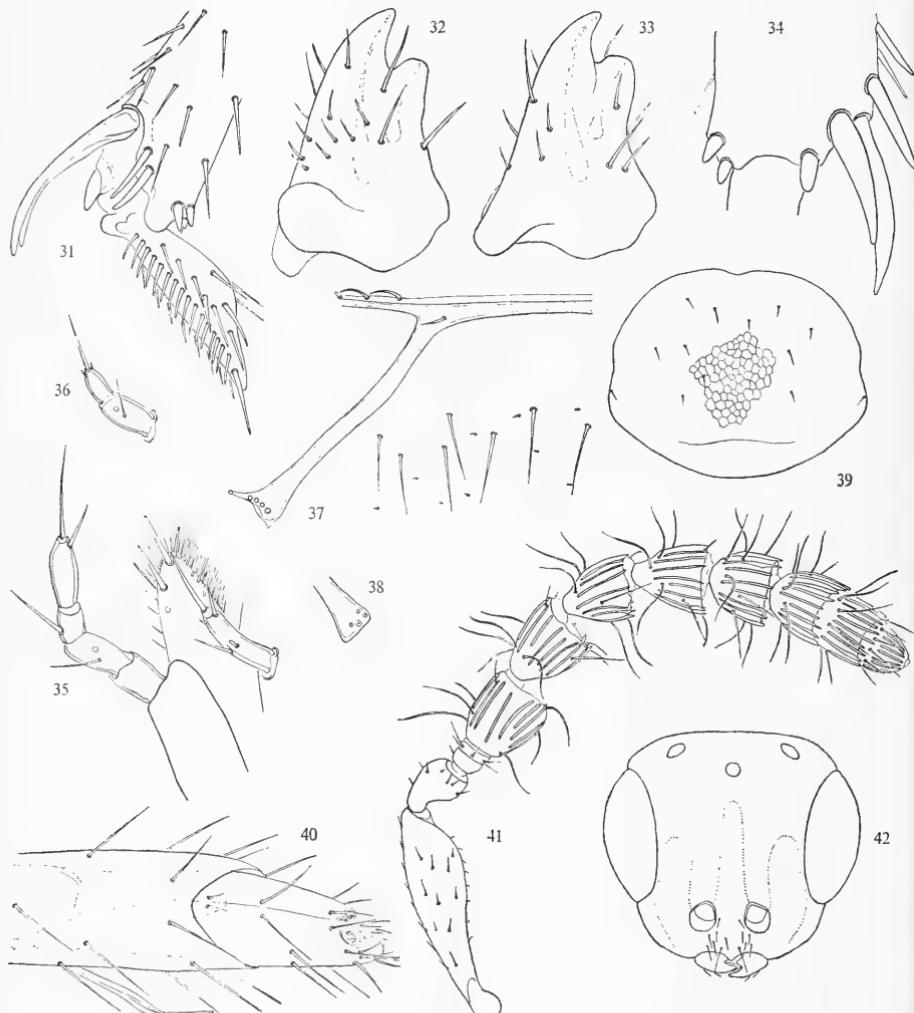


Fig. 31—42. *Arachonia borneensis* spec. nov., female (holotype, unless otherwise indicated). 31, apex of fore tibia, and metatarsus, axial aspect; 32—33, mandibles (paratype), 32, dorsal aspect of left mandible; 33, ventral aspect of right mandible; 34, apex of hind tibia, antiaxial aspect; 35, maxilla and labial palp, ventral aspect; 36, labial palp of paratype; 37, venation of left fore wing, detail; 38, stigmal vein of right fore wing; 39, scutellum (sculpture only partly indicated); 40, end of ninth, and tenth abdominal segment, valves, and tip of ovipositor, dorsal aspect (slightly oblique); 41, antenna, axial aspect; 42, head, frontal aspect (pubescence for the greater part omitted). — Fig. 31—36, $\times 250$; 37—38, $\times 165$; 39—41, $\times 100$; 42, $\times 65$

declining; the margins not converging backwards, but almost parallel; next to the peritremata occur six very long hairs, the mid part with some small hairs in the postero-lateral corners. Fore wing (5 : 2), 2.0 mm long; the submarginal, marginal, stigmal, and postmarginal veins (Fig. 37) approximately in ratio 21 : 4 : 4 : 7, the submarginal vein with one pustule, the stigmal with five (four in one row, and a fifth more distally, widely spaced from the others) or, at the other side of the same specimen, of a different shape (Fig. 38), with four pustules; the wing is almost hyaline, but with higher magnification appears to be covered by minute setae; seven very large hairs occur in the margino-stigmal angle; the distal two-thirds bear a short marginal fringe. Hind wing (4 : 1), 1.2 mm long; with small setae as in the fore wing, and some longer hairs along the marginal vein; three hamuli; the fringe of moderate length. Fore leg: the coxa more than twice as long as the trochanter, glabrous except for some long hairs at the axial side; the trochanter and femur with short hairs, particularly along the dorsal femoral margin; the femur three and a half times as long as the trochanter, approximately as long as the tibia; the tibia long-pubescent, with three spine-like, longer hairs at mid length on the ventral margin, the apical armature (Fig. 31) consisting of: one bifid, ventral spur, a large conical spine next to it but more apically and antiaxially, two long apical, peg-like spines, and four conical spines at the dorsal angle; the tarsus pentamerous, hirsute, fimbriated along the plantar edge, the first four segments with distal spines, the segments approximately in ratio 20 : 7 : 5 : 5 : 10. Mid leg slender, the coxa as long as the trochanter, but much wider; both segments with some long hairs; the femur almost thrice as long as the trochanter, sparsely long-pubescent; the tibia one and a half times as long as the femur, its long pubescence mixed with shorter hairs, the apex with some stouter, spine-like hairs, one short ventral spur and an accompanying blunt spine; the tarsus pentamerous, hirsute, the segments approximately in ratio 10 : 3 : 2 : 1 : 3, except for the fifth which bears a pair of spines at mid length, with distal spines. Hind leg: the coxa as long as the femur, the trochanter approximately one-quarter of this length, the tibia much longer than the femur (3 : 2); the coxa bears very long hairs at the dorso-apical edge, and particularly along the ventro-apical margin; the trochanter has some short hairs; the femur bears hairs along the dorsal margin, at the dorsal part of the disc, and some stouter hairs along the ventral margin; the tibia has a rather long pubescence, particularly dorsally, where spine-like hairs occur in two rows; the tibial armature (Fig. 34) consists of two subapical, ventral spurs, three antiaxial spines (two dorsals and one ventral), and many stout hairs along the axial, apical edge; the tarsal segments with hairs, a plantar fringe, and short apical spines, the lengths approximately in ratio 22 : 8 : 5 : 4 : 5.

Gaster ovoid in general shape, but tapering towards the apex; the terga with scattered hairs, the sterna with more, longer hairs; the spiracular peritremata of the eighth urotergite small. The ninth urotergite is very long, forming a setiferous sheath over the ovipositor; the tip (Fig. 40) is slightly swollen; between the end of the ninth urotergite and the short protruding valvae, a small hyaline lobe is visible, presumably representing the tenth urotergite; pygostyles are wanting. The ninth urotergite and the small protruding valvae combined, are approximately

four times as long as the apparent gaster (abdominal segments II-VIII).

Length (head and body up to and including the eighth abdominal segment), 2.5—2.7 mm. Colour dark brown, the dorsal parts with a green, shiny lustre, part of the face and the distal segments of the legs lighter.

Remark. — The new species is evidently related to *Arachonia plumosa* Joseph (1957 : 107—110, Fig. V 4—9, VI, VII 1—7), but it differs in the shape and number of the antennal sensilla and hairs (both much sparser in *A. plumosa*), in the armature of the fore tibia (less spines in *A. plumosa*), in the shape of the propodeum (the lateral margins converging backwards in *A. plumosa*), to mention some of the most obvious differential characters only.

Sycoryctes hilli spec. nov.

(Fig. 43—59)

Sycoryctes spec.; Wiebes, 1966, Zool. Meded. 41 : 153, fig. 1 (apex of gaster figured).

Material. — 3 ♀, 3 ♂, coll. Mus. Leiden, no. 720; Sungai Liwagu, North Borneo, 4000 ft., ex *Ficus stupenda* Miq. (leg. et det. E. J. H. CORNER, RSNB no. 2845); ♀ holotype, slide 720a; ♂, slide no. 720b.

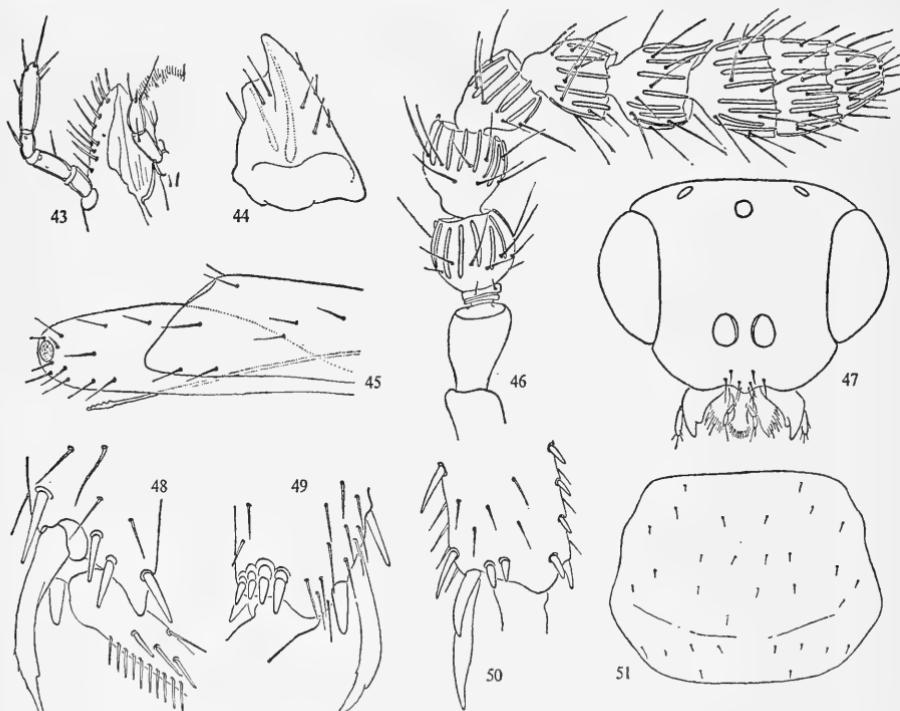


Fig. 43—51. *Sycoryctes hilli* spec. nov., female holotype. 43, labium and maxilla, ventral aspect; 44, mandible, dorsal aspect; 45, end of ninth abdominal segment, valve, and ovipositor, lateral aspect; 46, antenna, antiaxial aspect (scape omitted); 47, head, frontal aspect (pubescence partly omitted); 48—49, apex of fore tibia, and base of metatarsus, 48, axial aspect, 49, antiaxial aspect; 50, apex of hind tibia, antiaxial aspect; 51, scutellum. —

Fig. 43—44, 46, 50, $\times 165$; 45, 51, $\times 100$; 47, $\times 65$; 48—49, $\times 250$

Female. — Head (Fig. 47) transverse, the length slightly more than two-thirds of the width across the compound eyes; the face moderately pubescent, particularly in the lower half, shallowly grooved between the antennal toruli and the median ocellus; the sculpture reticulate. Eyes large and protruding, their longitudinal diameter more than twice as long as the cheek. Three ocelli. Epistomal margin with a distinct median lobe. Mandible (Fig. 44) bidentate. Maxillary palp (Fig. 43) four-segmented, the segments approximately in ratio 3 : 10 : 3 : 18, with hairs as in the figure. Labial palp (Fig. 43) consisting of two subequal segments. Antenna (Fig. 46) with its scape and pedicel reticulately sculptured; the scape five times as long as the pedicel, with scattered hairs; the third and fourth segments annuliform; the fifth to twelfth each with one regular row of long sensilla, all segments with long hairs; the fifth segment sub-globular, the sixth to tenth slightly longer, the eleventh and twelfth shorter; the last three segments shaped so as to form a club.

Thorax with heavy reticulate sculpture, and scattered hairs. Pronotum transverse, approximately thrice as wide as long; scutum twice as wide as its maximum length, the parapsidal furrows obsolete in the posterior two-thirds; the scutellum (Fig. 51) transverse, with scattered hairs; the metanotum with one hair on both lateral parts. Propodeum rather short, with longitudinal ridges mediad of the subcircular spiracular peritremata, and with many long hairs next to and behind the peritremata. Fore wing (5 : 2), 2.1 mm long; the submarginal, marginal, stigmal, and postmarginal veins approximately in ratio 7 : 4 : 2 : 6, the submarginal vein with two pustules, the stigmal with four; the wing almost hyaline, the fringe short. Hind wing (7 : 2), 1.1 mm long; three hamuli; the fringe longer. Fore leg (Fig. 48—49) moderately pubescent, the sculpture of the coxa up to and including the tibia reticulate; the coxa more than twice as long as the trochanter, and approximately half as long as the femur; the tibia as long as the femur, its apical armature consisting of one ventral spur accompanied by a large conical spine and three more slender spines at the axial side, five conical spines at the dorso-apical angle; the tarsus pentamerous, with the usual hairs and spines (the dorsal metatarsal spine rather long), the segments approximately in ratio 13 : 6 : 5 : 3 : 12. Mid leg with faint reticulate sculpture, with scattered hairs; the tibia one and a half times as long as the femur, its apical armature consisting of one rather long, ventral spur and five conical spines, one of which is situated close to the spur; the five tarsal segments approximately in ratio 10 : 5 : 4 : 2 : 4, with apical spines and scattered hairs. Hind leg (Fig. 50) much as in *Arachonia borneensis*; the tibia with a row of spines along the distal half of the dorsal margin and the distal third of the ventral, the apical armature consisting of two antiaxial, conical spines close to the ventral spurs, and one at the dorsal angle; the tarsus pubescent, with ventral and dorso-apical spines, the axial dorso-apical spines of the metatarsus and of the second segment almost reach to the distal end of the third and fourth segments, respectively; the tarsal segments approximately in ratio 25 : 9 : 4 : 3 : 10.

Gaster. The tubularly lengthened, ninth urotergite nearly four times as long as the body; pygostyles wanting. Apex of ninth urotergite, valve, and ovipositor, Fig. 45.

Length (head, and body up to and including the eighth abdominal segment), 2.4 mm. Colour of the dorsal parts dark brown, with a greenish hue; ventral parts and the legs lighter, yellow-brown.

Male. — Head (Fig. 52) slightly longer than its posterior width, one and a half times as long as its anterior width; finely pubescent. Compound eyes small, no ocelli. Epistomal margin nearly straight, with two long hairs. Mandible (Fig. 58) tridentate, the outer tooth acute, the inner truncate (more distinctly so in dorsal than in ventral aspect); one gland serves the two inner teeth; pubescence long but sparse. Maxillary palp (Fig. 53) four-segmented, the segments approximately in ratio 7 : 7 : 6 : 10. Labial palp (Fig. 53) two-segmented, the second segment one and a half times as long as the first. Antennal toruli large, situated close to the epistomal margin, not touching in the mid line. Antenna (Fig. 54) consisting of 13 free segments, three of which are annuliform, the last three segments form a club; the scape widening distad, not quite thrice as long

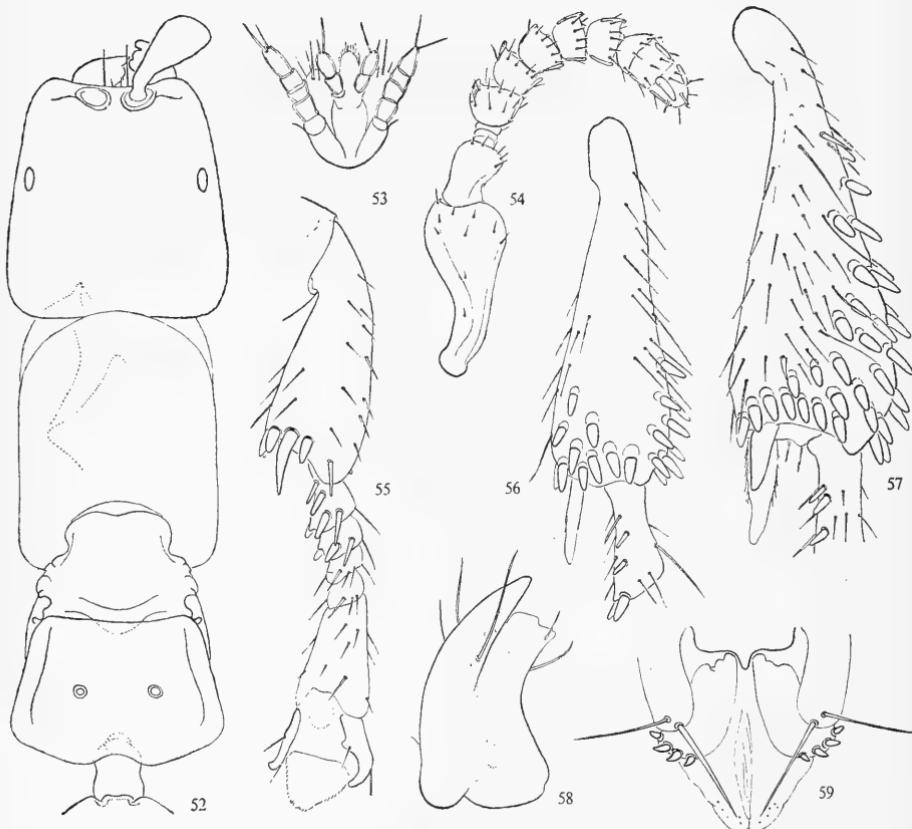


Fig. 52—59. *Sycoryctes billi* spec. nov., male. 52, head and thorax, dorsal aspect (pubescence omitted); 53, labium and maxillae, ventral aspect; 54, antenna, dorsal aspect; 55, fore tibia and tarsus, axial aspect; 56, mid tibia and tarsus, antiaxial aspect; 57, hind tibia and tarsus, antiaxial aspect; 58, mandible, ventral aspect; 59, genitalia, ventral aspect. — Fig. 52, $\times 100$; 53, 58—59, $\times 250$; 54—57, $\times 165$

as the pedicel; the pedicel robust; the funicular segments subequal, with rows of hairs, and lateral sensilla; the ultimate and penultimate segments of the club subequal in length, with sensilla, the basal club-segment half as long, without sensilla.

Thorax (Fig. 52) with scattered small hairs. Pronotum longer than wide (5 : 4), with straight lateral edges; the mesonotum of a complicate structure, with lobes and ridges, some hyaline protuberances between the lateral lobes probably represent the wing-remnants³⁾; the metanotum visible from above as two narrow sclerites laterad of the posterior quarter of the mesonotum and the anterior third of the propodeum. Propodeum large, about one and a half times as wide as long, with two dorsal, subcircular peritremata of the spiracles, and two sublateral longitudinal ridges set with a row of moderately long hairs. Fore leg (Fig. 55) sparsely pubescent; some of the hairs, particularly those of the coxa, strong and spine-like; the coxa as long as the femur, but much wider; the tibia two-thirds of the length of the femur, its apical armature consisting of five conical spines close to the ventral spur, one axial slender spine close to the dorsal angle, and one conical spine at the antiaxial side of the dorsal angle; the five tarsal segments approximately in ratio 7 : 5 : 4 : 3 : 15, the first two segments with robust ventral and lateral spines, the first three with plantar protuberances. Mid leg (Fig. 56) more robust than the fore leg, the tibia distinctly longer than the femur, with a long spur and a number of conical spines on the ventro-apical part of the disc, most of which can be seen in antiaxial view, and more slender spines along the apical third of the dorsal margin; the five tarsal segments approximately in ratio 23 : 9 : 6 : 4 : 23, the first two segments with ventral spines. Hind leg (Fig. 57) much like the mid leg, but larger, and the coxa much longer; the tibia with a similar set of spines close to the ventral spurs, but with many more dorsal spines, some of which are long and slender; the five tarsal segments approximately in ratio 23 : 7 : 5 : 3 : 10, the metatarsus with many ventral spines, the second segment with only two apical, conical spines.

Gaster. The first segment (second abdominal segment; Fig. 52) has the shape of a petiole. Genitalia, Fig. 59; the claspers with four claws, the parameres with two hairs.

Length (head and thorax), 1.0 mm. Colour yellow-brown.

Remark. — The type species of the genus *Sycoryctes* Mayr needs to be re-described, so it seems best to compare the new species with one of the better known species of the genus.

The female has two antennal ring-segments, versus one in *S. trifemmensis* Joseph (1957 : 110—113, Fig. VIII), there are more spines along the apical margin of the fore tibia, the hind tibia bears spines along the dorsal and ventral margins, which appear to be lacking in *S. trifemmensis*.

The male is distinct from any of the species described in *Sycoryctes*, both in its general shape and in the structure of the antenna. I place it here, because in another sample of fig wasps I found a similar male associated with a female

³⁾ The material is too poor for a more extensive description.

apparently belonging to *Sycoryctes*. Moreover, the longitudinal ridges of the propodeum are also found in the other species of *Sycoryctes*.

It is a pleasure to name the new species to D. S. HILL M.Sc., Commonwealth Institute of Entomology, London, who studies the fig wasp fauna of Hong Kong.

Sycoscapter reticulatus spec. nov.

(Fig. 60—90)

Material. — 4 ♀, 5 ♂ (and 3 giant males), coll. Mus. Leiden, no. 718; Sungei Liwagu, North Borneo, 4000 ft., ex *Ficus stupenda* Miq. (leg. et det. E. J. H. CORNER, RSNB no. 2845); ♀ holotype, slide no. 718a, ♀ paratype, slide no. 718b; ♂, slide no. 718c; ♂, giant form, slide no. 718d.

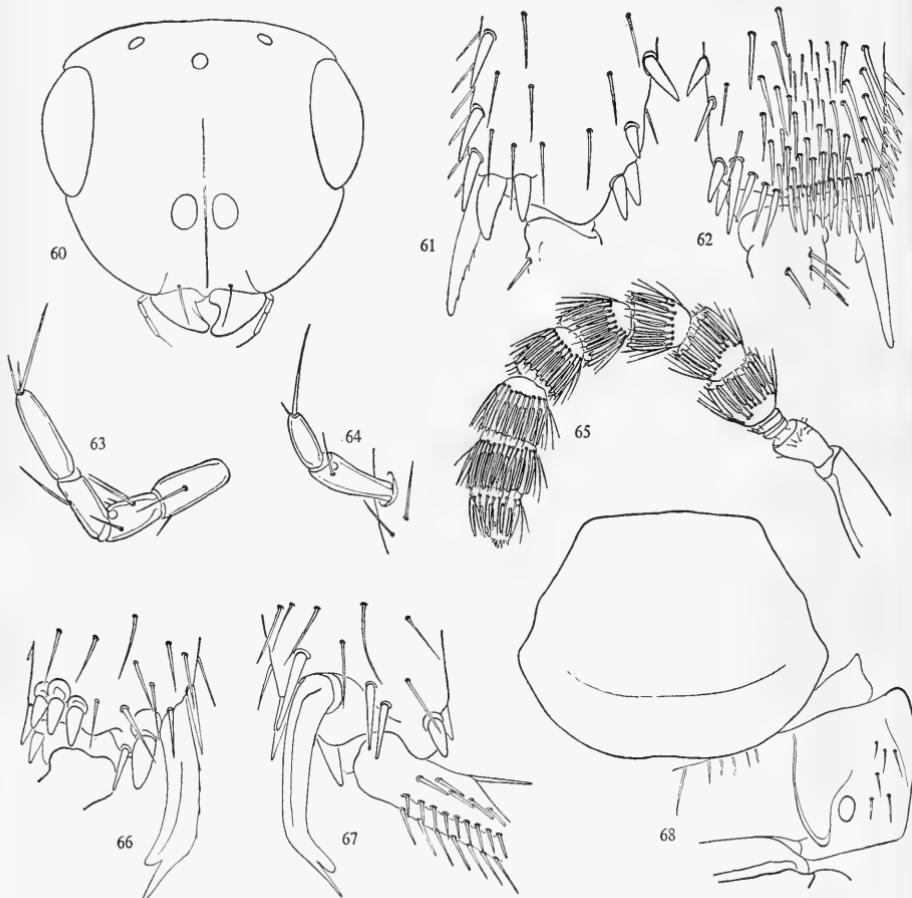


Fig. 60—68. *Sycoscapter reticulatus* spec. nov., female holotype. 60, head, frontal aspect (pubescence omitted); 61—62, apex of hind tibia, 61, antiaxial aspect, 62, axial aspect; 63, maxillary palp, ventral aspect; 64, labial palp, ventral aspect; 65, antenna, antiaxial aspect; 66—67, apex of fore tibia and base of metatarsus, 66, antiaxial aspect, 67, axial aspect; 68, scutellum, part of metanotum, propodeum, and first gastral segment, dorsal aspect (pubescence partly omitted). — Fig. 60, $\times 65$; 61—64, 66—67, $\times 250$; 65, 68, $\times 100$

Female. — Head (Fig. 60) little shorter than wide across the compound eyes, with a narrow ridge reaching from the epistomal margin to more than halfway between the antennal toruli and the median ocellus; pubescence of the face short and scattered, longer and denser along the ridge below the toruli. Sculpturation reticulate. Eyes small, the longitudinal diameter about as long as the cheek; not bulging. Three ocelli. Epistomal margin with a distinct median, triangular lobe. Mandible bidentate, the second tooth truncate; with some hairs on the dorsal disc. Maxillary palp (Fig. 63) four-segmented, with ventral hairs as in the figure, and more hairs on the dorsal surface of the first and second segments; the segments approximately in ratio 14 : 11 : 12 : 20. Labial palp (Fig. 64) two-segmented, the proximal segment one and a half times as long as the distal. Antenna (Fig. 65) rather compact; the scape four times as long as pedicel; the third and fourth segments annuliform; the fifth to ninth subequal, with long hairs and a regular row of about fifteen long sensilla; the tenth to twelfth shaped so as to form a club.

Thorax with heavy reticulate sculpture, pubescence short and scattered. Pronotum transverse, more than twice as wide as long; scutum not quite twice as wide as its median length, the parapsidal furrows obsolete for the posterior two-thirds; the scutellum (Fig. 68) subpentagonal. Propodeum with longitudinal ridges mediad of the spiracular peritremata, and along the lateral margins, with a few hairs next to the peritremata. Fore wing (5 : 2), 2.0 mm long; the submarginal, marginal, stigmal, and postmarginal veins approximately in ratio 13 : 7 : 5 : 12, the submarginal vein with two pustules, the stigmal with four; the membrane almost hyaline; with about ten long hairs in the margino-stigmal angle; the fringe short. Hind wing (4 : 1), 1.5 mm long; three hamuli; the fringe longer than that of the fore wing. Fore leg with reticulate sculpture; the coxa longitudinally striate; the femur one and a half times as long as the coxa, four times as long as the trochanter, and slightly longer than the tibia; these segments moderately pubescent; the apical armature of the tibia (Fig. 66—67) consisting of a ventral spur accompanied by one antiaxial and two axial spines (the one large and robust, the other slender), two slender spines along the antiaxial, distal margin, and five robust spines at the dorsal angle; the tarsal segments approximately in ratio 15 : 8 : 6 : 4 : 7. Mid leg rather pubescent; the tibia one and a half times as long as the femur, its ventral spur of normal length, accompanied by one short, conical spine, one other spine occurs at the posterior, dorsal angle; the tarsal segments approximately in ratio 12 : 6 : 4 : 3 : 8. Hind leg with the coxa nearly as long as the femur; the trochanter not half as long; the tibia (Fig. 61—62), nearly one and a half times as long as the femur, with scattered hairs and approximately 13 spines in two rows along the distal two-thirds of the dorsal margin, heavily hirsute and spinose towards the axial apex, with several conical spines at the dorsal angle, and a large spine close to the ventral spurs at the antiaxial side; the metatarsus with longitudinal rows of hairs, the apical spine not particularly long, the tarsal segments approximately in ratio 16 : 7 : 4 : 3 : 6.

Gaster. The ninth urotergite tubular, more than thrice as long as the body, six times the length of the apparent gaster. Pygostyles wanting.

Length (head and body up to and including the eighth segment), 2.5 mm. Colour blackish bronze, the antennal scape and pedicel, and the legs yellowish, the coxae darker, the antennal flagellum as dark as the body.

Male. — Head (Fig. 75, 78) one and one-quarter longer than wide, depress, or, in a larger form (Fig. 79) approximately as long as wide and less depress. Pubescence short and scattered; in the larger form some longer hairs occur on the dorsal disc close to the occipital margin. Compound eyes of moderate size, no ocelli. Epistomal margin widely emarginate to nearly straight. Mandible (Fig. 71) robust, blunt at tip; with two glands. Maxillary palp (Fig. 74) four-segmented, the segments approximately in ratio 2 : 3 : 1 : 3, with long hairs. Labial palp (Fig. 70) consisting of two subequal segments. Antennal toruli spaced from each other and from the epistomal margin for a distance about equal to their width. Antenna (Fig. 69) consisting of eleven free segments, one of which is annulariform, the last three shaped so as to form a club; the scape two and a half times as long as its maximum width, slightly dilated, twice as long as the pedicel; the first funicular segment when viewed from above, distinctly wider than the second or third, and twice as long, the fourth larger than the third, the fifth as long as the third; the first segment of the club as long as the other two combined. The flagellar segments have transverse rows of hairs, and some bear sensilla, not all of which are visible from above (cf. Fig. 69, dotted lines).

Thorax with some long hairs (often abraded) as in Fig. 90, otherwise subglabrous. Pronotum wider than long, not tapering frontad; the sclerite representing mesonotum and propodeum narrower and shorter; the lateral parts, presumably representing the metanotum, distinctly separate, the posterior margins subhyaline; the spiracular peritremata of the propodeum small, subcircular. Wing remnant, Fig. 90. The legs are rather short and robust, the coxae large, bearing some long antiaxial hairs close to the insertion of the trochanter (hind leg), and a short, scattered axial pubescence; the femora with scattered, moderately long hairs, particularly along the margins. Fore tibia (Fig. 72) expanded distad, the apical armature consisting of the blunt ventral spur, a row of peg-like spines along the distal margin (three axial spines are more slender than the others), and one subapical spine at the dorsal angle; the pubescence is rather long and scattered; the tarsus pentamerous, the segments approximately in ratio 8 : 4 : 3 : 2 : 11. Mid tibia (Fig. 73) quite similar to that of the fore leg in general shape, though it is larger, and the armature of peg-like spines extends along the dorsal margin; the tarsus pentamerous, the segments approximately in ratio 7 : 5 : 4 : 3 : 16. Hind tibia (Fig. 76) much like the mid tibia, but larger and more slender, the spines are longer, most of the axial distal spines (three of which are visible in the figure, between the metatarsus and the spur) slender, although distinctly blunt at tip; the segments of the pentamerous tarsus approximately in ratio 5 : 3 : 2 : 2 : 9.

Gaster. The parameres of the genitalia with two subapical hairs; the claspers (Fig. 77) with six claws.

Length (head and thorax), 1.0—1.3 mm. Colour yellow-brown.

Remark. — *Sycoscapter reticulatus* spec. no., is evidently related to *S. insignis*

Saunders, the female of which was described by JOSEPH (1953: 77—81, Fig. 73—86) as *Indothymus crenulatus*. It differs in some important characters, viz. the female is much larger and more robust, and the reticulate sculpturation is heavier; the median process of the epistomal margin is less prominent (the difference between *S. insignis* and *S. reticulatus* seems to be of the same magnitude as that between *Sycoscapter inubiae* (Ishii) and *S. gajimaru* (Ishii), respectively; cf. ISHII, 1934: Pl. 1 fig. 12 and 20); there are more sensilla on the antennal segments, and they are more regularly placed; there are more apical spines on the fore tibia, particularly at the dorsal angle; there are about one and a half times

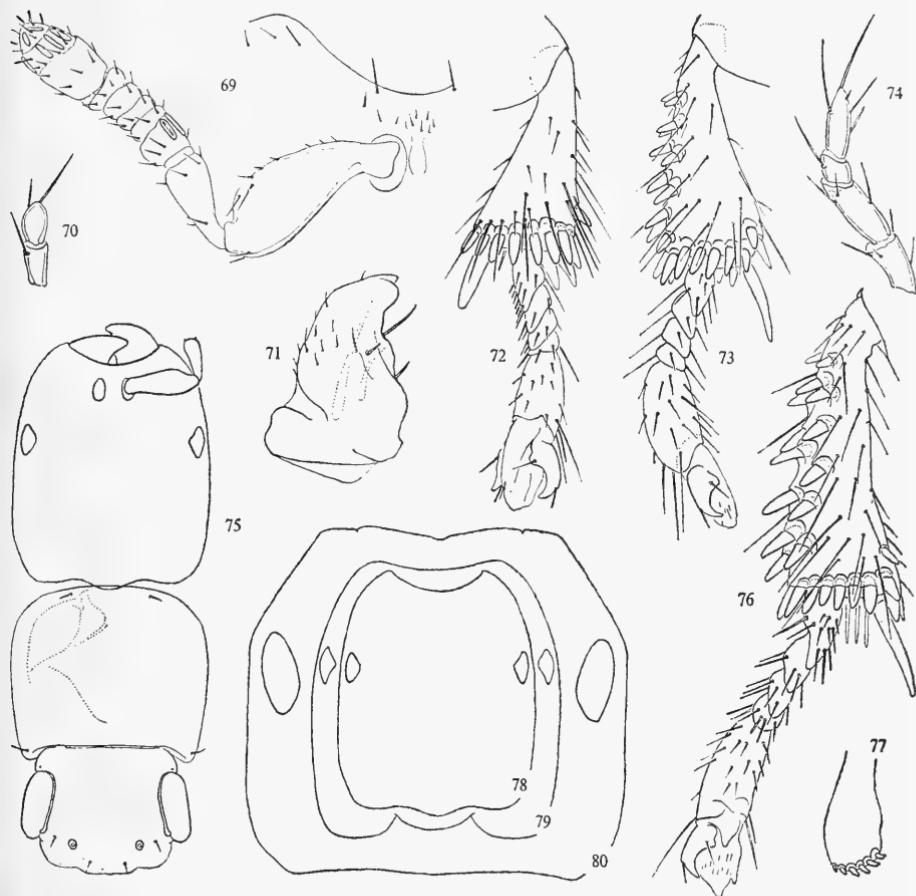


Fig. 69—79. *Sycoscapter reticulatus* spec. nov., male. 69, epistomal margin, and antenna, dorsal aspect; 70, labial palp, ventral aspect; 71, mandible, dorsal aspect; 72, fore tibia and tarsus, antiaxial aspect; 73, mid tibia and tarsus, antiaxial aspect; 74, maxillary palp, ventral aspect; 75, head and thorax, dorsal aspect (pubescence omitted); 76, hind tibia and tarsus, antiaxial aspect; 77, clasper of the genitalia; 78—79, outline of head of two different males. — Fig. 80. *Sycoscapter* ? *reticulatus*, outline of male head. — Fig. 69, 71—73, 75, X 165; 70, 74, 77, X 250; 78—80, X 65

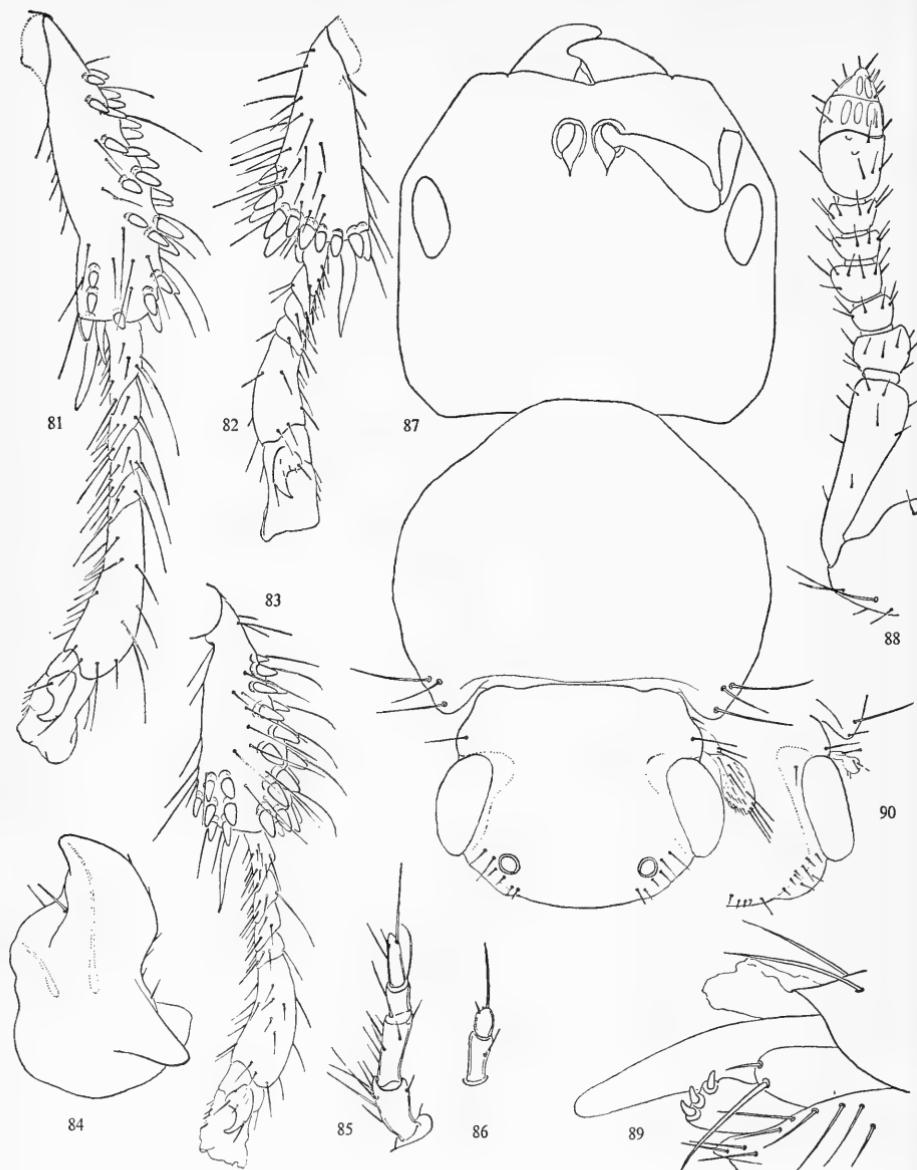


Fig. 81—89. *Sycoscapter* ? *reticulatus*, giant male. 81, hind tibia and tarsus, antiaxial aspect; 82, fore tibia and tarsus, antiaxial aspect; 83, mid tibia and tarsus, antiaxial aspect; 84, mandible, ventral aspect; 85, maxillary palp, ventral aspect; 86, labial palp, ventral aspect; 87, head and thorax, dorsal aspect (pubescence partly omitted); 88, antenna, dorsal aspect; 89, genitalia, lateral aspect. — Fig. 90. *Sycoscapter reticulatus* spec. nov., male, detail of thorax, for comparison with Fig. 87. — Fig. 81—83, $\times 100$; 84—86, 88, 90, $\times 165$; 87, $\times 65$; 89, $\times 250$

as many spines along the dorsal margin of the hind tibia, and the spines are larger; the ninth urotergite is relatively longer in *S. reticulatus* than in *S. insignis*.

Although the male shows several differential characters, e.g. in the shape and structure of the wing remnants (which are more filament-like in other species of *Sycosapter*), I am confident that it belongs here. The larger male alluded to in the description differs in size and in the shape of the head (cf. Fig. 78—79), but it is otherwise essentially similar, and evidently conspecific.

Another male, of unknown relationship, is described below. In presumably essential characters, it is similar to the males described above, and it may be a giant form of *S. reticulatus*. It is, however, aberrant in shape and to a less degree, in the spines of the legs and the genitalia, so as to make the specific identification uncertain.

Male, giant form (Fig. 80—89). — Head (Fig. 80, 87) large and robust, slightly wider than long. Compound eyes rather large, no ocelli. Epistomal margin shallowly emarginate, the median part indistinctly invaginated. Mandible (Fig. 84) short and robust, with two glands. Maxillary palp (Fig. 85) four-segmented, the segments approximately in ratio 8 : 10 : 4 : 9, with many long hairs, particularly on the dorsal discs of the first and second segments. Labial palp (Fig. 86) two-segmented, the first segment about twice as long as the second. Antennal toruli half closed when viewed from above, situated close together but widely spaced from the epistomal margin. Antenna (Fig. 88) much like that of the male described above, but the third funicular segment larger; the sensilla indistinct.

Thorax (Fig. 87) distinct from that of the smaller males by its shape: the pronotum tapering in front, its maximum width nearly one and a half times the length; the lateral sclerites (presumably representing the metanotum) rather small, and less elongate than in the other males. Wing remnant large, pubescent. Fore leg (Fig. 82) essentially similar to that of the male described above; the tarsal segments approximately in ratio 15 : 10 : 9 : 8 : 40. Mid leg (Fig. 83): the tibia has more antiaxial spines at the ventral angle, and the distal row of peg-like spines is less complete; the tarsal segments approximately in ratio 10 : 5 : 5 : 4 : 24. Hind leg (Fig. 81): the apical armature of the tibia is reduced, the distal row consisting of a few scattered peg-like spines only; the tarsal segments approximately in ratio 3 : 2 : 1 : 1 : 8.

Gaster. Genitalia, Fig. 89; the claspers bear three claws.

Length (head and thorax), 1.8 mm. Colour dark brown, the gastral tergites and sternites sclerotized, and distinctly darker than the connecting membranes.

Sycosapteridea stilifera spec. nov.
(Fig. 91—102)

Material. — 2 ♀, coll. Mus. Leiden, no. 719; Sungei Liwagu, North Borneo, 4000 ft., ex *Ficus stupenda* Miq. (leg. et det. E. J. H. CORNER, RSNB no. 2845); ♀ holotype, slide no. 719a.

Female. — Head (Fig. 99) distinctly shorter than wide across the compound

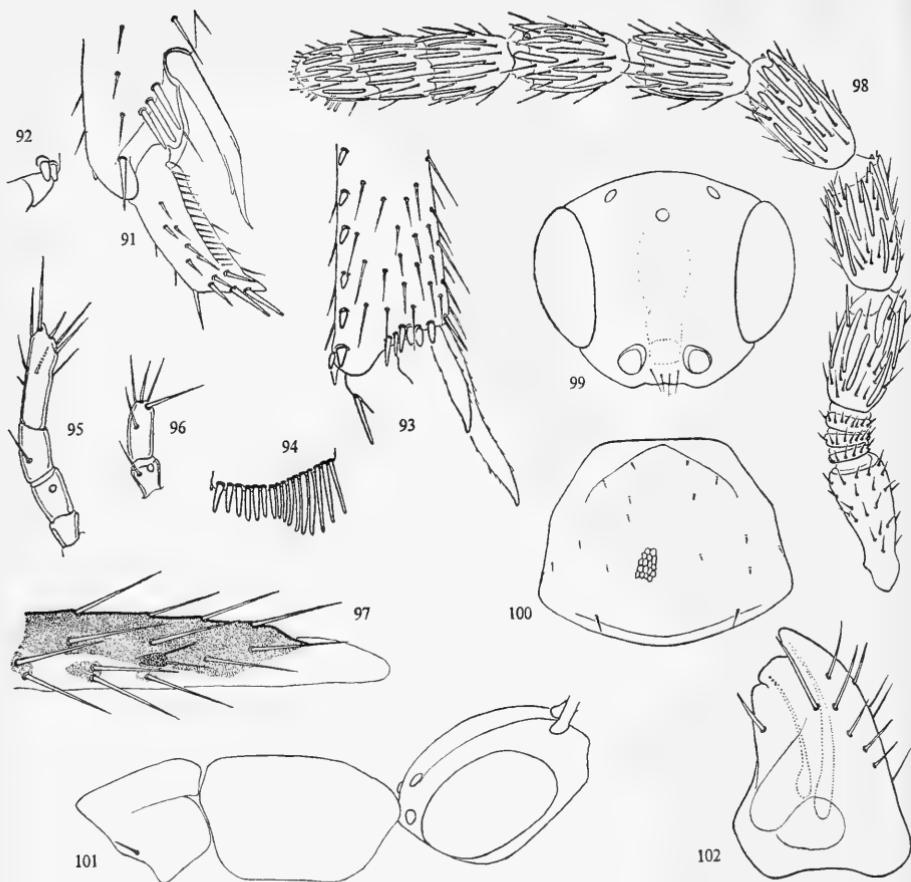


Fig. 91—102. *Sycoscapteridea stilifera* spec. nov., female holotype. 91—92, apex of fore tibia, and metatarsus, 91, axial aspect, 92, detail in antiaxial view; 93—94, apex of hind tibia, 93, antiaxial aspect; 94, detail in axial view; 95, maxillary palp, ventral aspect; 96, labial palp, ventral aspect; 97, end of ninth abdominal segment, lateral aspect; 98, antenna, antiaxial aspect; 99, head, frontal aspect (pubescence omitted); 100, scutellum (sculpturation only partly indicated); 101, scutum, pronotum and head, lateral aspect (semidiagrammatical); 102, mandible, dorsal aspect. — Fig. 91—96, 102, $\times 250$; 97—98, $\times 165$; 99, 101, $\times 65$; 100, $\times 100$

eyes, rather robust in lateral view (Fig. 101). Face moderately pubescent, sculpture reticulate, a shallow groove runs from the median ocellus to the antennal toruli. Eyes large and slightly protruding, the longitudinal diameter twice as long as the cheek. Three ocelli. Epistomal margin only very faintly bilobed. Mandible (Fig. 102) bidentate, although the second tooth is again bilobed; with two glands; dorsal surface with hairs, ventral surface almost glabrous. Maxillary palp (Fig. 95) four-segmented, the segments approximately in ratio 4 : 6 : 7 : 14; the ultimate segment with about ten hairs. Labial palp (Fig. 96) two-segmented,

the second segment twice as long as the first, with five hairs. Antenna (Fig. 98) consisting of 13 segments, three of which are annuliform, the last three shaped so as to form a club; the scape and the pedicel hirsute, the scape more than twice as long as the pedicel; the ring-segments each with a row of hairs; the funicular segments subequal in length, with hairs and irregular rows of long sensilla; the segments of the club diminishing in size toward the tip, otherwise similar to those of the funicle.

Thorax almost glabrous, with reticulate sculpturation as indicated in Fig. 100. Pronotum (Fig. 101) wide and very long, about as long as the head; the scutum almost half as long as the pronotum, with two long black hairs on the parapsides (as on the axillae), the parapsidal furrows more nearly complete than in any of the other Sycoryctini described in this paper, but obsolete in the posterior fifth; scutellum (Fig. 100) more angular than in *Arachonia borneensis*, but almost of the same size and structure, more like *Sycoryctes billi* in general outline but distinctly smaller; metanotum short, narrower than the propodeum. Propodeum rather long, with the usual ridges, and with long hairs posterior to the spiracular peritremata and along the lateral margins. Fore wing (5 : 2), 2.2 mm long; the submarginal, marginal, stigmal, and postmarginal veins approximately in ratio 16 : 18 : 7 : 18, the submarginal vein with two pustules, the stigmal with four in one row; the membrane moderately pubescent; the fringe of moderate length. Hind wing (3 : 1) rather broad, 1.2 mm long; the fringe long. Fore leg moderately pubescent on the antiaxial surfaces, subglabrous on the axial; with reticulate sculpturation; the coxa more than thrice as long as the trochanter, not much shorter than the femur; the tibia straight, its apical armature (Fig. 91—92) consisting of two axial, dorsal, conical spines, one antiaxial, dorsal spine, and three peg-like spines close to the ventral spur, moreover, the dorso-apical angle is distinctly produced; the tarsus pentamerous, fimbriate along the plantar edge, hirsute, and provided with the usual spines, the segments approximately in ratio 7 : 4 : 2 : 3 : 9. Mid leg slender, hirsute; the tibia distinctly longer than the femur, its ventral spur normal, longer than that in *Arachonia borneensis*; the tarsal segments approximately in ratio 14 : 6 : 4 : 2 : 3. Hind leg moderately hirsute; the coxa about as long as the femur, the tibia slightly longer; the apical armature of the tibia (Fig. 93—94) consists of peg-like spines along the anti-axial distal margin, two ventral spurs (the one not nearly twice as long as the other), a row of spine-like hairs along the axial margin (Fig. 94), and two conical spines at the dorso-apical angle, the dorsal margin with a row of peg-like spines; the tarsus pentamerous, the segments approximately in ratio 20 : 11 : 8 : 3 : 6, the apical spines short.

Gaster. The ninth urotergite is more than three times as long as the body, the tip bears small pygostyles (Fig. 97).

Length (head and body up to and including the eighth abdominal segment), 2.8 mm. Colour almost uniform yellowish brown.

Remark. — This species differs from the species previously described in the genus *Sycoscapteridea* Ashmead, by several characters, some of which may be enumerated as follows. The antennal toruli are situated rather close to the epistomal

margin; there are three antennal ring-segments (versus one in the other species); the pronotum is particularly long; the ninth urotergite bears pygostyles. As JOSEPH (1953, 1957), in his descriptions of several species of *Sycoscapteridea*, evidently did not recognize the true morphological character of the "tail" of these insects, the pygostyles may have escaped his attention.

The type species of the genus *Sycoscapteridea* Ashmead, viz. *Sycoscapter monilifer* Westwood, is known in the male sex only.

Otiesellini

Grandiana corneliae spec. nov. (Fig. 103—121)

Material. — 14 ♀, 2 ♂, coll. Mus. Leiden, no. 784; Sungei Liwagu, North Borneo, 4000 ft., ex *Ficus stupenda* Miq. (leg. et det. E. J. H. CORNER, RSNB no. 2845); ♂ holotype, slide no. 784a, ♀ allotype, slide no. 784b.

Male. — Head (Fig. 103, 105) strongly transverse, approximately twice as wide as long, depress. Compound eyes rather large, no ocelli. Epistomal margin with a prominent median lobe directed ventrad; hypostomal margin, Fig. 104. Mandible (Fig. 107) tridentate, with three glands; the outer tooth long and acute, the two other almost truncate, directed towards the orifice. Maxillary palp (Fig. 106) two-segmented, the segments subequal in length, partly fused; labial palp (Fig. 106) unisegmented; hairs and spines as in the figure. Antennal toruli almost lateral in position. Antenna (Fig. 110) consisting of ten free segments, two of which are annuliform; the scape large, slightly dilated, the apical dorsal ridge subhyaline, covering a groove for the reception of the pedicel; the pedicel nearly half as long as the scape; the funicular segments subequal in shape, the first largest, the fourth smallest, all with one antiaxial sensillum and with small hairs along the distal margins; the club as long as the pedicel, evidently composed of three fused segments, with a few sensilla and sensillar hairs.

Thorax, Fig. 103. Terga shaped so as to form a carapace; the pronotum more than twice as wide as long; the mesonotum and metanotum fused, incompletely separated from the propodeum; the spiracular peritremata subcircular. Fore wing reduced, hind wing absent. Legs short and robust; the coxae transverse; the femora slightly expanded dorsad, also ventrad in the mid and hind legs; the tibiae with a great number of antiaxial, conical spines and long hairs, the axial surfaces flat and subglabrous; the tarsi tetramerous, long pubescent. Fore tibia and tarsus, Fig. 111; there is a distinct ventral spur; the tarsal segments approximately in ratio 2 : 1 : 1 : 2. Mid tibia and tarsus, Fig. 109; the tarsal segments approximately in ratio 8 : 4 : 3 : 10. Hind tibia and tarsus, Fig. 112; the tarsal segments approximately in ratio 10 : 5 : 4 : 13.

Gaster short. Genitalia (Fig. 108) with three pairs of appendages, viz. the parameres with two long, apical hairs, the inner lobes with one hair, and the claspers with four claws.

Length (head and thorax), 1.2 mm (paratype) to 1.5 mm (holotype). Colour yellowish brown, the legs (particularly the tibial spines) darker.

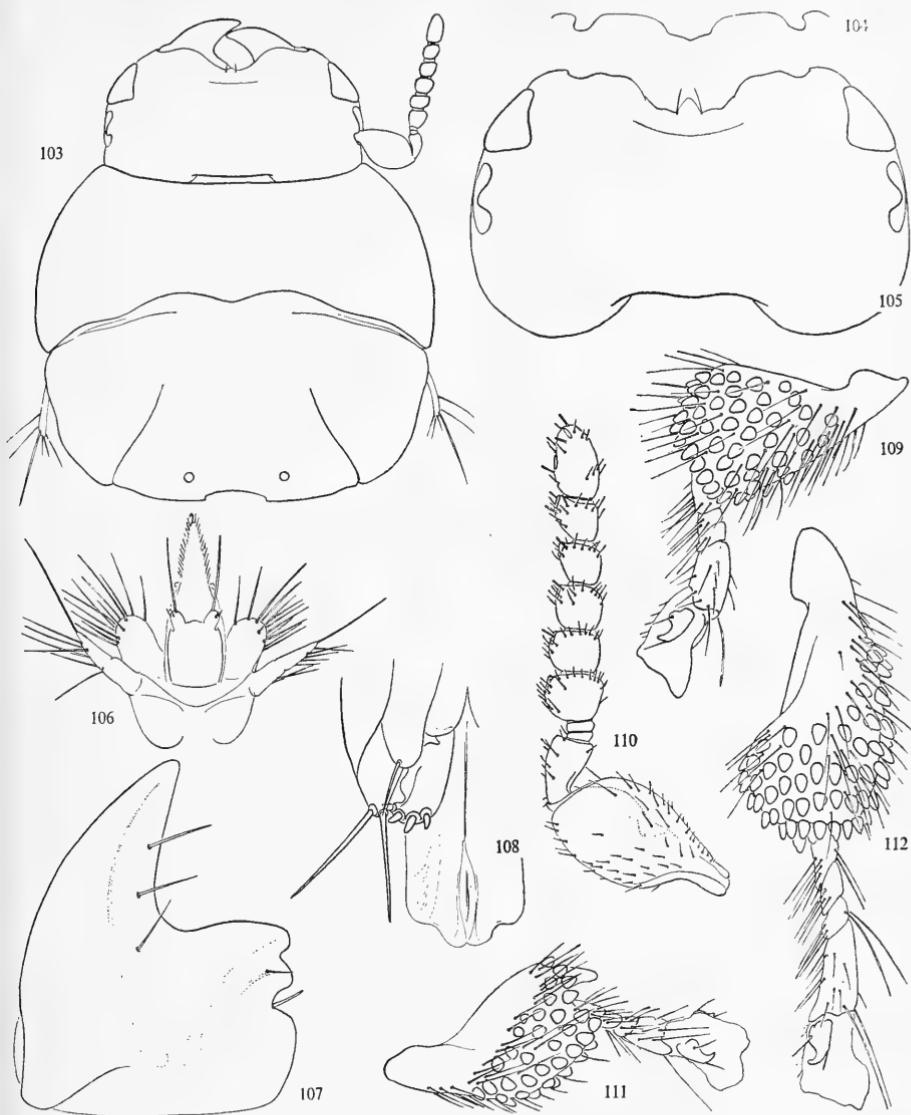


Fig. 103—112. *Grandiana corneliae* spec. nov., male holotype. 103, head and thorax, dorsal aspect (pubescence omitted); 104, hypostomal margin, ventral aspect; 105, head, dorsal aspect (pubescence omitted); 106, labium and maxillae, ventral aspect; 107, mandible, ventral aspect; 108, penis and genital armature, ventral aspect; 109, mid tibia and tarsus, antiaxial aspect; 110, antenna, dorsal aspect; 111, fore tibia and tarsus, antiaxial aspect; 112, hind tibia and tarsus, antiaxial aspect. — Fig. 103, \times 40; 104—105, \times 65; 106—107, \times 165; 108, \times 250; 109—112, \times 100

Female. — Head (Fig. 117) little more than half as long as wide across the compound eyes, rather depress in lateral aspect. Face finely striate, with fine pubescence. Eyes large and bulging, the longitudinal diameter more than twice as long as the cheek. Three ocelli. Epistomal margin with two rounded, prominent lobes. Mandible (Fig. 119) tridentate, with three glands. Maxillary palp (Fig. 113) four-segmented, the segments approximately in ratio 2 : 3 : 2 : 5. Labial palp (Fig. 113) two-segmented, the second segment one and a half times as long as the first. Antennal toruli rather widely spaced. Antenna (Fig. 116) consisting of 13 free segments, three of which are annuliform, the last three shaped so as to form a club; the scape slender, almost four times as long as the pedicel; the first two annuli subequal, the third distinctly wider and longer; the funicular segments subequal, long-pubescent so as to almost obscure the narrow sensilla, each segment with a row of approximately 15 sensilla in the distal half; the segments of the club slightly shorter than those of the funicle, similar in pubescence and in the pattern of the sensilla.

Thorax with reticulate sculpturation and sparse, short pubescence. Pronotum transverse, short but distinctly visible in dorsal aspect; the scutum twice as long as wide posteriorly, the maximum width equal to the length, the parapsidal furrows complete; the scutellum subpentagonal, with rounded edges, the maximum length three-quarters of the maximum width; the metanotum very short. Propodeum short in the median part, dilated laterad, with two distinct ridges mediad of the subcircular spiracular peritremata, laterally with many, rather long hairs. Wings, Fig. 118. Fore wing more than twice as long as wide, 2.7 mm long; the submarginal, marginal, stigmal, and postmarginal veins approximately in ratio 20 : 10 : 5 : 4, the stigmal vein with four pustules in one row; the membrane finely pubescent in the distal two-thirds, some darker patches occur in the proximal third; the fringe short but distinct. Hind wing (4 : 1), 2.0 mm long; the fringe longer. Fore leg sparsely hirsute, the coxa nearly thrice as long as the trochanter, four-fifths of the length of the femur, and as long as the tibia; the tibial armature (Fig. 114—115) consisting of a long, ventral spur accompanied by some antiaxial spines, two conical spines at the dorsal angle, and a row of four peg-like spines along the axial, distal margin; the tarsus pentamerous, the segments approximately in ratio 10 : 5 : 4 : 4 : 8, the first two segments with a plantar protuberance between the distal spines. Mid leg long and slender, moderately long-pubescent; the tibia longer than femur and coxa combined, with some spine-like hairs next to the ventral spur; the tarsus pentamerous, the segments approximately in ratio 13 : 6 : 4 : 3 : 5. Hind leg long-pubescent; the coxa, femur and tibia subequal in length; the tibial armature (Fig. 120) consisting of two ventral spurs (the one twice as long as the other), two spines at the ventral angle, three conical spines along the antiaxial, distal margin, a comb of axial, peg-like spines, and a row of about eight spines along the distal half of the dorsal margin; the tarsus pentamerous, with rather long hairs, stout but short apical spines, and a plantar comb of spine-like hairs; the segments approximately in ratio 18 : 6 : 5 : 3 : 5.

Gaster scarcely depressed laterad, twice as long as the thorax, the distal segments curved ventrad; the ovipositor valves distinctly projecting beyond the apex of the abdomen; the pygostyles (Fig. 121) with five long hairs.

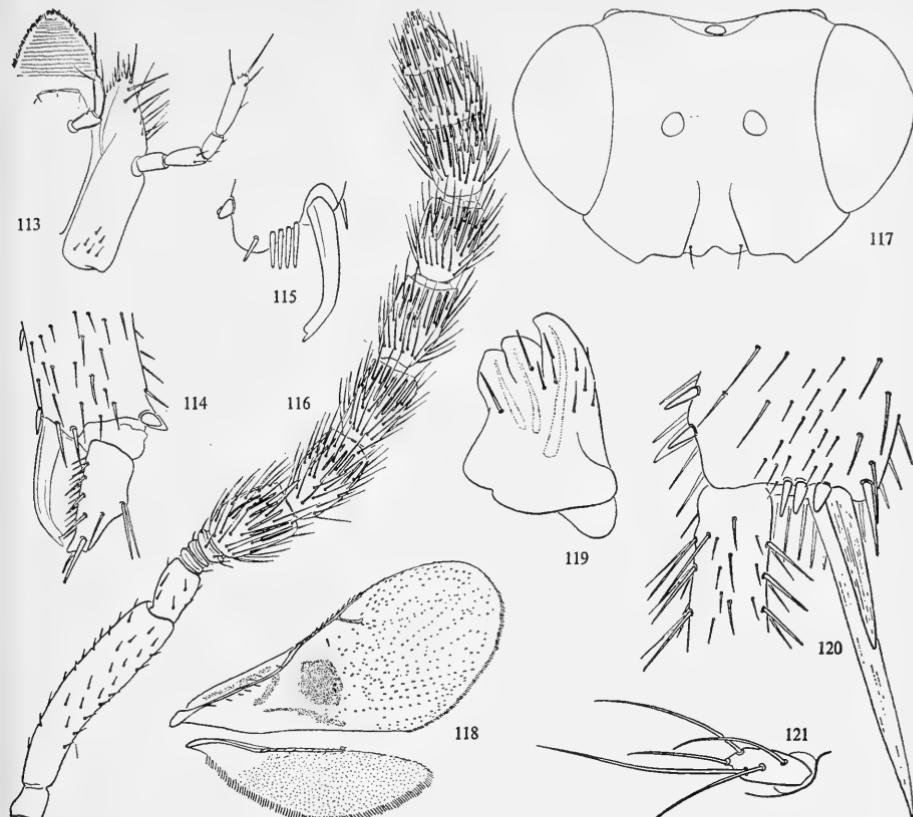


Fig. 113—121. *Grandiana corneliae* spec. nov., female allotype. 113, labium and maxilla, ventral aspect; 114—115, apex of fore tibia, and metatarsus, 114, antiaxial aspect, 115, detail in axial aspect; 116, antenna, antiaxial aspect; 117, head, frontal aspect (pubescence omitted); 118, wings; 119, mandible, dorsal aspect; 120, apex of hind tibia and base of metatarsus, antiaxial aspect; 121, pygostyl, lateral aspect. — Fig. 113—115, 119—120, \times 165; 116, \times 100; 117, \times 65; 118 \times 16; 121, \times 250

Length (head, thorax, and gaster), approximately 3 mm. Colour black bronze, the legs except for the black coxae, yellowish; the palps of the mouth parts and the antennae infuscated; the compound eyes pinkish red.

Remark. — *Grandiana corneliae*, evidently related to *Grandiana wassae* Wiebes (1961 : 245—249, Fig. 1—19), may be distinguished in both male and female specimens by the more transverse head, the shape and pubescence of the antennal segments, and the greater number of tibial spines; the male, moreover, has two antennal ring-segments, versus one in *G. wassae*, and the toruli of the antennae are situated laterally, not ventrally; the postmarginal vein of the female fore wing is distinctly longer than in *G. wassae*.

The host of the present species, *Ficus stupenda* Miq. (subgenus *Urostigma*, section *Conosycea*) is only remotely related to that of *G. wassae*, *Ficus wassae* Roxb. (subgenus *Ficus*, section *Sycidium*).

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NEW AND LITTLE KNOWN APHIDS FROM PAKISTAN (HOMOPTERA, APHIDIDAE)

BY

D. HILLE RIS LAMBERS

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ABSTRACT

In this paper the following new genera and species are described from Northern Pakistan. *Aphis longituba* spec. nov., from unidentified herbaceous climber; *Ceruraphis eastopi* spec. nov., from *Viburnum cotinifolium*; *Chaitophorus kapuri* spec. nov., from *Populus ciliata*; *Chaitophorus nigritus* spec. nov., from *Salix* sp.; *Chaitophorus pakistanicus* spec. nov., from *Salix acmophylla* and *S. tetrasperma*; *Cinara lachnirostris* spec. nov., from *Pinus* (probably *wallichiana*); *Cinara maculipes* spec. nov., from *Pinus wallichiana*; *Epipemphigus* gen. nov., type-species *Pemphigus imaiicus* Cholodkovsky, 1912; *Globulicaudaphis* gen. nov., type-species *Globulicaudaphis pakistanaica* spec. nov., from *Quercus* (probably *dilatata*); *Macrosiphum pachysiphon* spec. nov., from *Rubus lasiocarpus*; *Liosomaphis atra* spec. nov., from *Berberis* sp.; *Matsumuraja capitophoroides* spec. nov., from *Rubus lasiocarpus* and *Rubus* sp.; *Periphyllus vandenboschi* spec. nov., from *Acer* sp.; *Pseudessigella* gen. nov., type-species *Pseudessigella brachychaeta* spec. nov., from *Pinus wallichiana*.

Some notes on the identity of *Chaitophorus himalayensis* (Das, 1918), often mistaken for *C. pakistanicus* spec. nov., are given. It is suggested that *Hayhurstia tataricae* Aizenberg, 1935, from *Lonicera tatarica* is a synonym of *Brevicoryne coriandri* Das, 1918, from *Coriandrum*, referred to *Hyadaphis* Kirkaldy, 1904, type-species *Aphis xylostei* Schrank, 1801, of which genus *Neohayhurstia* Aizenberg, 1954, type-species *Hayhurstia tataricae* Aizenberg, 1935, becomes a synonym. The fundatrix of *Epipemphigus imaiicus* (Cholodkovsky, 1912) is described for the first time, and a key to the apterous females of *Matsumuraja* Schumacher, 1921, is given.

Introduction

Dr. R. VAN DEN BOSCH, Berkeley, California, managed to collect, during a short stay in Northern West Pakistan, a considerable number of aphid samples which he most kindly gave to me for identification. Where not otherwise indicated, all the material originates from this collector. Several undescribed species which were already familiar to me from material received from my colleagues Mr. A. N. BASU and Mr. K. D. VERMA, will later be described by them. Other species are described here, partly also from material received for identification from the Commonwealth Institute for Biological Control.

Types of new species are in the author's collection, with the exception of those of *Ceruraphis eastopi* spec. nov.

Aphis longituba spec. nov.

Apterous viviparous female.

In life pale green, mottled with darker green on abdomen; appendages pale

except siphunculi which are black-tipped. In mounted specimens body oval, about 1.3—1.6 mm long. Tergum completely unpigmented. Extremely small marginal tubercles present, on abdominal segment I, where they are but little wider in diameter than the papilla of a marginal hair but rather taller than their basal width, and on segment VII, where they are a little wider than the porus of the nearest stigma. Dorsal hairs scarce, those on abdominal tergite III about 0.016—0.025 mm long, stiff, subacute, but the 2 hairs on tergite VIII up to 0.060 mm long; marginal hairs on tergites II—IV usually in double pairs, sometimes in a single pair on tergite III. Front slightly sinuated. Antennae pale with the processus terminalis faintly smoky; flagellum imbricated; processus terminalis at most as long as segment III, usually shorter, 2—2½ times base of segment VI; hairs on segment III scarce (e.g. 7 or 9), half as long as basal diameter of the segment. Rostrum just reaching the hind coxae; last segment rather long, about 1½—1¼ times as long as second joint of hind tarsi, with 2, more rarely 3 hairs besides the 3 subapical pairs. Siphunculi quite pale with apical 1/8—1/6 blackish, gradually tapering from base to apex, in the middle about 1¼ times as wide, at apex about as wide as the hind tibiae, imbricated, with rather small flange, about 1/5—2/9 of length of body, 2½—3½ times as long as cauda. Cauda small, at base about twice as wide as middle of siphunculi, more or less like that of *Aphis gossypii* Glover, cylindrical to tapering with rounded top, with 5—6 hairs. Legs rather long, pale with brownish tarsi; trochanter and femora on the underside with at least a few hairs fine and long, longer than the basal width of a femur; tibial hairs rather like those of *A. gossypii*, short; first tarsal joints with 3, 3, 2 hairs, second joints markedly imbricated.

Measurements in mm.

No.	Length of body	Ant.	Ant. segments				Siph.	Cauda
			III	IV	V	VI		
1.	1.50	1.02	0.29	0.16	0.15	(0.10 + 0.22)	0.33	0.12
2.	1.42	0.95	0.23	0.15	0.13	(0.11 + 0.22)	0.30	0.11
3.	1.32	1.00	0.25	0.17	0.14	(0.10 + 0.24)	0.32	0.10
4.	1.46	0.91	0.25	0.13	0.12	(0.09 + 0.21)	0.32	0.12
5.	1.45	1.00	0.28	0.17	0.13	(0.11 + 0.23)	0.33	0.12
6.	1.47	0.95	0.25	0.13	0.14	(0.09 + 0.23)	0.32	0.13

(1—6, from an unidentified plant, Murree, West Pakistan, 3.VII.1964).

Discussion. This *Aphis* was collected from the curled tender tips (undersides) of a vine-like herbaceous plant. Species of the genus with such long, slender siphunculi that are pale are scarce, and I know of no other than *A. farinosa* Gmelin, very different as to marginal tubercles, and *A. idaei* v. d. Goot which has much thinner siphunculi. Some species of the group infesting *Ribes* and *Onagraceae* have such long pale siphunculi, but these always have more than 3 hairs on the basal half of the last rostral segment and longer antennal hairs. The long pale siphunculi with their conspicuously dark tips, and the small cauda, together

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with the scarcity of marginal tubercles and the few rostral hairs make recognition of the species within the very large genus *Aphis* L. quite easy.

Types. Holotype: apterous viviparous female (measurements no. 1), from an unidentified plant, Murree, West Pakistan, 3.VII.1964 (R. VAN DEN BOSCH), P-VII-3a. Paratypes: 6 apterae viviparae with data as for the holotype.

Ceruraphis eastopi spec. nov.
(Fig. 1—2, p. 208)

Alate viviparous female.

Colour in life not known. In mounted specimens body about 2.70—3.15 mm long, elongated. Head and thorax blackish sclerotic; abdomen with extensive darkish dorsal sclerotisation consisting of thick spino-pleural bars which are mutually free on tergites I and II, but except medially sometimes almost completely fused on tergites III—VI. Marginal tubercles variable, sometimes on all segments from I—VII, but always on II—IV, low, flat, on segments II—IV about 0.015 mm in diameter. Spinal tubercles very small, very irregularly present on tergites I—VIII, mesonotum or vertex. Dorsal hairs fine, on tergite III up to 0.045 mm long; tergite IV with mostly single spinal and pleural pairs, but with up to 8 marginal pairs, on more anterior tergites usually with several additional spinal and pleural hairs; tergite VIII with 4—5 hairs. Posterior row of 6—8 hairs on vertex remarkably far from posterior margin of head. Front sinuated. Antennae blackish, about $\frac{3}{5}$ of length of body; segment III on basal one-third distinctly imbricated, with about 15—23 rather protruding, mostly large and partly markedly transversely oval rhinaria over whole length; segment IV with 1—5, rarely without such rhinaria; segment V rarely with a secondary rhinarium, but with an enormous primary rhinarium of about 0.10 mm long and 0.035 mm wide (Fig. 1), covering up to half the length of the segment; segment VI with a hardly smaller primary rhinarium, which covers much more than half the basal portion of the segment; hairs on segment III rather bent and adpressed, up to just longer than basal diameter of the segment. Rostrum reaching to half way the middle coxae; last segment rather elongated, about $\frac{10}{11}$ of second joint of hind tarsi, with 2 hairs besides the 3 subapical pairs. Siphunculi tapering from base to apex or slightly constricted at base, dark, about $\frac{1}{15}$ of length of body, in the middle $\frac{11}{10}$ — $\frac{11}{5}$ times as thick as middle portion of hind tibiae, dorsally from base to apex with a few wavy transverse lines of bluntnish spinules, ventrally with very dispersed imbrications bearing few blunt spinules, and these imbrications near apex running together to form cells (Fig. 2); flange hardly indicated. Cauda $\frac{2}{3}$ — $\frac{4}{5}$ of siphunculi, dark, triangular with convex sides, rather acute, with 5 hairs. Legs rather long; femora blackish with pale base; tibiae dark with blackish base and apex; the hind tibiae over most of their length, the other tibiae near base, with a very curious, vague, wavy transverse striation similar to that on distal two-thirds of antennal segment III; first tarsal joints with 3, 3, 2 hairs. Venation of wings normal; subcostal vein system and pterostigma conspicuously pale.

Measurements in mm.

No.	Length of body	Ant.	Ant. segments						Rhin. on segments		
			III	IV	V	VI	Siph.	Cauda	III	IV	V
1.	3.11	1.88	0.47	0.25	0.23	(0.15 + 0.60)	0.17	0.12	16 & 18	2 & 4	0 & 0
2.	2.92	1.74	0.38	0.21	0.22	(0.15 + 0.61)	0.16	0.13	16 & 16	3 & ?	0 & ?
3.	2.73	1.69	0.36	0.21	0.21	(0.15 + 0.60)	0.16	0.13	21 & 23	1 & 5	0 & 0
4.	2.77	1.72	0.39	0.22	0.20	(0.16 + 0.59)	0.17	0.13	14 & 16	3 & 4	0 & 0
5.	2.82	1.74	0.40	0.20	0.21	(0.16 + 0.61)	0.16	0.13	21 & 22	1 & 3	0 & 0
6.	2.85	1.71	0.38	0.20	0.21	(0.16 + 0.60)	0.16	0.13	15 & 17	3 & 4	0 & 1

(1—6, from *Viburnum cotinifolium*, Otre, West Pakistan, 12.IX.1962, Commonwealth Inst. Biol. Control, C.I.E. no. 18753: 847).

Larvae.

Embryos in alatae. Antennae of 4? segments; processus terminalis (fully stretched) only 1.4 times base of last segment; base with one stout and one small hair; penultimate segment with two stout, and one small hair, last rostral segment 0.065, with two hairs besides the 3 subapical pairs.

Alatoid nymphs, last instar. On abdomen with small dark marginal sclerites bearing mostly 1 or 2 hairs and a tubercle. Spinally especially on the posterior tergites, from IV or V caudad, with very small, caudad much larger sclerites bearing one hair each, and besides, especially on tergites VII and VIII, a spinal tubercle; all tubercles more pronounced, and larger than in most adults. Primary rhinaria on antennal segments V and VI round, ciliate, rather large, about 0.025—0.035 mm across the rims. Hind tibiae without spinules. As in other species of the genus there is an unusually large distance between the first and the second pair of coxae.

Discussion. The eight alatae that were collected evidently were not gynoparae returned from their secondary host plant, for the same sample contained a number of almost mature alatoid nymphs. Therefore the specimens must have developed on *Viburnum*. Notwithstanding the date of collecting, the fact that only alatae, and only alatoid nymphs were found, seems to suggest host alternation. Perhaps the specimens were leaving *Viburnum* for a secondary host plant. In other species of the genus the host plants are Cyperaceae, rarely Juncaceae. Indeed Dr. REMAUDIÈRE has collected a *Ceruraphis* on some species of *Carex* in Iran which might be this species, but the alatae lack the gigantic primary rhinaria of *C. eastopi*.

These rhinaria make recognition of the described morph very easy, for to my knowledge no other member of this subfamily with such primary rhinaria has been described. However, almost certainly other morphs do not have such unusual rhinaria: in the alatoid nymphs the primary rhinaria are of ordinary shape. The sculpture of the siphunculi may be useful for identifying the other morphs when these are found.

The very short processus terminalis in the embryos inside the described alatae suggests that in apterae the processus terminalis is much shorter than in the described alatae. When the apterae are found they could be identified by the curious mixture of short and long hairs on the last two antennal segments of the embryos that they contain.

The species is named after Dr. V. F. EASTOP, British Museum (Natural History), London.

Types. Holotype: alate viviparous female (measurements no. 1), from *Viburnum cotinifolium*, Otre, West Pakistan, 12.IX.1962 (Commonwealth Inst. Biol. Control, C.I.E. no. 18753: 847). Paratypes: 7 alatae and 7 alatoid nymphs with data as for the holotype. The holotype and all but two alate paratypes are in the British Museum (Natural History), London.

Chaitophorus himalayensis (Das, 1918)

DAS (1918) mentions in his description of *Eichochoaitophorus himalayensis* that the siphunculi in the apterae viviparae are brown. The processus terminalis is about $2\frac{1}{2}$ times as long as the base of antennal segment VI. These characters do not apply to material identified by TAKAHASHI and recorded by him from Siam, and to other specimens identified as *himalayensis* Das, from Pakistan and India.

Material of a species from *Salix* from India agrees with the description of *himalayensis* by DAS in the pigmentation of the siphunculi and the length of the processus terminalis. The first tarsal joints of the apterae viviparae have 7 hairs, and the abdominal dorsum is distinctly nodulose.

Chaitophorus kapuri spec. nov.

Apterous viviparous female.

Colour in life not noted, but presumably largely blackish. Mounted specimens dorsally dark to blackish sclerotic with the head laterally, and a not sharply bordered median area from metanotum to about tergite III distinctly paler to pale. Abdominal tergites II—VI solidly fused, the other tergites mutually free. Dorsum not smooth but rather evenly covered with mostly irregularly arranged, not joined, semiobtuse to blunt spinules which in lateral view are little more than half as high as their basal width; locally these spinules are arranged in wavy transverse lines. Dorsal hairs acute or somewhat acuminate, stiff, not wavy; the longest spinal hairs on abdominal tergite III up to 6 times basal diameter of antennal segment III. Antennae about $5/7$ — $2/3$ of length of body, with segment I and the part near the rhinaria on segment VI dusky to dark, the rest quite pale, slightly imbricated; segment III with on inner side 2—4 hairs of about 3 — $3\frac{3}{4}$ times basal diameter of the segment, and with some much shorter hairs rather similar to those on outer side which are about as long as basal diameter of the segment; base of segment VI with 2—3 hairs, the longest of which is $1\frac{2}{3}$ —2 times the shortest; for interrelation of antennal segments vide measurements. Last rostral segment about as long as second joint of hind tarsi, with 2—4 hairs besides the 3 subapical pairs. Siphunculi very short, blackish, not surrounded by a membranous ring, with 3—4 rows of transverse reticulations apically that are only well visible in lateral view. Cauda rather pale, distinctly knobbed, with the knob usually wider than long. Legs completely pale with only the apices of the tarsi slightly dusky; tibiae with a few short spinules at the very tip; first tarsal joints with 7, 7, 7 hairs; empodial hairs ribbon-shaped.

Measurements in mm.

No.	Length of body	Ant.	Ant. segments				Siph.	Cauda
			III	IV	V	VI		
1.	1.53	1.11	0.29	0.14	0.14	(0.10 + 0.33)	0.05	0.11
2.	1.86	1.20	0.33	0.15	0.14	(0.10 + 0.34)	0.06	0.12
3.	1.57	1.16	0.31	0.16	0.14	(0.11 + 0.32)	0.06	0.10
4.	1.56	1.14	0.30	0.16	0.13	(0.11 + 0.33)	0.06	0.10
5.	1.95	1.34	0.37	0.21	0.15	(0.11 + 0.35)	0.07	0.10
6.	1.92	1.14	0.36	0.20	0.15	(0.11 + 0.32)	0.07	0.10

(1—4, from *Populus ciliata*, Murree (7000 ft), Pakistan, 30.VI.1964 (R. VAN DEN BOSCH); 5—6, from *Populus*, Manali (6000 ft), India, 25.VI.1955 (A. P. KAPUR)).

Alate viviparous female.

Colour in life not noted. Mounted specimens with black head and thorax, with on the abdominal dorsum thick spino-pleural, blackish, transverse bars from segment II or III to VIII, which bars tend to fuse to a central sclerite from tergites III to VI; marginal abdominal sclerites blackish, on segments II—V each with 6—11 hairs and on the posterior part with a very slender tubercle that often looks like the socket of a large hair with the shaft broken near the base. Antennae $\frac{3}{4}$ — $\frac{5}{6}$ of the length of body, pigmented as in apterae, but with also the apex of segment V somewhat darkened; hairs on inner side of segment III considerably shorter than in apterae, but still up to $3\frac{1}{2}$ times as long as basal diameter of segment III because the latter is constricted at base; segment III with about 10—12 rather large rhinaria more or less in a row over the length of the segment. Siphunculi conical, nearly as long as their basal width, dark, with 3—4 rows of basad transverse reticulations. Legs pallid as in apterae. Wings with normal venation, the veins very conspicuously and rather broadly darkly bordered.

Measurements in mm.

No.	Length of body	Ant.	Ant. segments				Siph.	Cauda	Rhin. on III
			III	IV	V	VI			
1.	1.70	1.29	0.35	0.18	0.15	(0.11 + 0.36)	0.07	0.10	12 & 12
2.	1.64	1.17	0.35	0.16	0.13	(0.10 + 0.30)	0.08	0.10	10 & 12
3.	1.62	1.30	0.33	0.19	0.15	(0.12 + 0.38)	?	0.09	10 & 11
4.	1.63	1.27	0.37	0.17	0.14	(0.11 + 0.34)	0.07	0.09	10 & ?

(1—4, with apterae no. 1—4).

Larvae.

In mounted specimens head darkish, the rest pale, without dark scleroites at the bases of the dorsal hairs. Siphunculi blackish, apparently reticulated before adulthood.

Discussion. The insects infest the undersides of the leaves of *Populus ciliata*. No data are available on the attendance by ants. The completely unpigmented legs,

in sharp contrast to the dark body, and the strongly bordered veins of the wings make recognition of this species very easy.

Types. Holotype: apterous viviparous female (measurements no. 1), from *Populus ciliata*, Murree (7000 ft), West Pakistan, 30.VI.1964. Paratypes: apterae and alatae with the same collecting data.

Chaitophorus nigritus spec. nov.

Apterous viviparous female.

In life black with pale legs and antennae. In mounted specimens tergum evenly black with the head laterally just paler. Abdominal tergites II to VI completely fused, the rest mutually free. Tergum with very small bluntish nodules that are joined to wavy lines that mostly medially run more or less parallel, with on the thorax here and there a faint tendency to reticulation. Dorsal hairs slightly flexed, with fine apices; the longest spinal hairs on abdominal tergite III about 5 times as long as basal diameter of antennal segment III. Antennae pale with segment I, the distal half of the processus terminalis and sometimes the area near the rhinaria on the last segment dusky to dark, sometimes on one side of 5 segments, $1\frac{1}{2}$ — $5\frac{1}{8}$ of the length of body; segment III on inner side with 3—6 hairs of up to $2\frac{1}{2}$ —3 times basal diameter of the segment and with some shorter ones that yet are $1\frac{1}{2}$ times or more times that diameter and considerably longer than those on outer side which are mostly shorter than that diameter; the longest of the 2, rarely 3 hairs on the base of the last segment $2\frac{1}{2}$ —3 times as long as the shortest. Last rostral segment very nearly as long as second joint of hind tarsi, with 2 hairs besides the 3 subapical pairs; one pair of the latter placed very far basad. Siphunculi black, surrounded by a membranous area, more or less conical, distinctly reticulated on distal half. Cauda knobbed, pale with dusky knob, the latter wider than long. Legs pale with the tarsi wholly or distally dusky; tibiae only at the very apex with some spinules; first tarsal joints with 5 hairs; empodial hairs setaceous, blunt to acute.

Measurements in mm.

No.	Length of body	Ant.	Ant. segments				Siph.	Cauda
			III	IV	V	VI		
1.	1.30	0.73	0.16	0.09	0.10	(0.09 + 0.22)	0.04	0.05
2.	1.13	0.67	0.15	0.08	0.10	(0.08 + 0.18)	0.04	0.05
3.	1.36	0.75	0.17	0.09	0.09	(0.09 + 0.22)	0.04	0.05
4.	1.39	0.78	0.18	0.10	0.09	(0.09 + 0.21)	0.04	0.05
5.	1.11	0.63	0.12	0.09	0.08	(0.08 + 0.18)	0.03	0.04
6.	1.42	0.80	0.17	0.10	0.10	(0.09 + 0.23)	0.05	0.05

(1—6, from *Salix* sp., Murree (7500 ft), Pakistan, 27.VI.1964).

Intermediate.

Like apterae viviparae, but thorax rather like that in alatae, with small wing pads. Antennae with 8 and 11 small secondary rhinaria on segment III, with 2 and 2 on IV, and with 0 and 1 on V.

Larvae.

From birth with black scleroites to the bases of the dorsal hairs.

Discussion. According to its collector the aphids live most characteristically in tight colonies around galls on the leaves of *Salix* sp. No data on myrmecophily are available.

In structure and ornamentation of the dorsum this species strongly resembles *Chaitophorus salicti* (Schrank, 1801), but it can at once be distinguished by the membranous ring around the siphunculi, the shorter, less hairy last rostral segment and unpigmented legs in, otherwise, solidly black specimens.

Types. Holotype: apterous viviparous female (measurements no. 1), from *Salix* sp., Murree (7500 ft), West Pakistan, 27.VI.1964. Paratypes: apterae viviparae with the same collecting data.

Chaitophorus pakistanius spec. nov.

Apterous viviparous female.

Colour in life not known, but almost certainly greenish or yellowish. Mounted specimens completely pale. Integumentum dorsally virtually smooth. Dorsal hairs variable in length, stiff, mostly rather thick, the marginal ones acute, the rest rarely partly acute, normally either partly acuminate or all with furcated apices; longest spinal hairs on abdominal tergite III from 3— $5\frac{1}{2}$ times basal diameter of antennal segment III. Antennae $4\frac{4}{9}$ — $5\frac{5}{9}$ of length of body, always with the area near the rhinaria on segment VI and the apical half of the processus terminalis dark or dusky, sometimes with segment I, the apex of segment V, and the whole segment VI, dusky; base of segment III slightly attenuated; that segment on inner side with 2—5 rather stiff hairs with bluntnish apices that are $1\frac{1}{2}$ —2 times basal diameter of the segment, often hardly longer than some hairs on the outer side; basal part of segment VI with 2 rather short hairs of about equal length; processus terminalis $1\frac{3}{5}$ — $2\frac{1}{5}$ times base of last segment. Last rostral segment only $3\frac{3}{4}$ — $5\frac{5}{6}$ of second joint of hind tarsi, with 2 long hairs as long as the longest of the 3 subapical pairs; of the latter one pair placed far basad. Siphunculi not pigmented, very small, truncated conical or cylindrical, with only 2—3 rows of transverse reticulation at apex. Cauda pale, knobbed, the knob broader than long. Legs pale with dusky second tarsal joints; tibiae smooth, in some of the specimens from Kashmir with a few pseudosensoria; first tarsal joints with 5 hairs; empodial hairs thinly setaceous.

Measurements in mm.

No.	Length of body	Ant.	Ant. segments				Siph.	Cauda
			III	IV	V	VI		
1.	1.67	0.93	0.25	0.13	0.12	(0.10 + 0.20)	0.06	0.10
2.	1.72	0.88	0.23	0.12	0.11	(0.09 + 0.19)	?	0.10
3.	1.52	0.81	0.25	0.12	0.10	(0.09 + 0.14)	0.06	0.10
4.	1.64	0.79	0.21	0.11	0.10	(0.09 + 0.17)	0.06	0.10
5.	1.50	0.68	0.20	0.09	0.09	(0.08 + 0.12)	0.06	0.10
6.	1.48	0.79	0.22	0.12	0.11	(0.08 + 0.14)	0.06	0.10

(1—2, from *Salix acmophylla*, Mardan, Pakistan, 3.XII.1962 (Commonwealth Inst. Biol. Control); 3—4, from *Salix acmophylla*, Hangu, Pakistan, 9.XII.1962 (Commonwealth Inst. Biol. Control); 5—6, from *Salix tetrasperma*, Jammu, Kashmir, 24.II.1964 (K. D. VERMA)).

Oviparous female.

Mounted specimen similar to apterous viviparous female, but body larger, cauda not constricted, hind tibiae swollen with about 40 pseudosensoria.

Measurements in mm.

No.	Length of body	Ant. segments						Siph.	Cauda
		III	IV	V	VI				
1.	1.98	0.92	0.25	0.14	0.12	(0.10 + 0.19)		0.04	0.10

(1, with apterae 3—4).

Larvae.

Dorsal hairs without pigmented sclerites at their bases. First two antennal segments often brownish.

Discussion. The few records published after that of DAS (1918) of *Chaitophorus himalayensis* (Das) probably relate to the present species, which in many respects agrees with the description by that author, except for its pale siphunculi and shorter processus terminalis. Specimens from *Salix*, Chiengmai, Thailand, 5.V.1940, received from Dr. TAKAHASHI and identified and recorded by him as *Chaitophorus himalayensis* (Das) differ slightly from the material described above by having a few more hairs on antennal segment III.

In a number of characters the new species agrees with colourless specimens of *Chaitophorus salicti* (Schrank), but the short last rostral segment and almost smooth abdominal tergum, as well as the short processus terminalis make recognition easy.

Types. Holotype: apterous viviparous female (measurements no. 1), from *Salix acmophylla*, Mardan, Pakistan, 3.XII.1962 (Commonwealth Inst. Biol. Control). Paratypes: apterae viviparae with collecting data as above; from *Salix acmophylla*, Hangu, Pakistan, 9.XII.1962 (Commonwealth Inst. Biol. Control); from *Salix tetrasperma*, Jammu, Kashmir, 24.II.1964 (K. D. VERMA).

Cinara lachnirostris spec. nov.

Apterous viviparous female.

In life small, darkish brown. Mounted specimens pale, with the head, pronotum, mesothoracic furca, the customary six longitudinal rows of small, roundish pleural intersegmental sclerites ("Muskelplatten") more or less dark brown, the siphuncular cones and a broken bar across abdominal tergite VIII light brown, and very vague, mottled pleuro-marginal areas on the mesonotum. Dorsal skin with even, very fine reticulation. Dorsal hairs on the thorax stiff, spinally somewhat acuminate

and not longer than basal diameter of antennal segment III, marginally acute and up to $1\frac{1}{2}$ times that diameter; on the disc of abdomen caudad gradually shorter and blunter, till on tergite V the hairs are quite blunt and cylindrical and down to $\frac{1}{3}$ or even $\frac{1}{4}$ the mentioned diameter, from where they again increase in length till on tergite VIII they are as long as the marginal hairs on abdomen and thorax; the short spinal hairs with dark sockets but not on sclerotic platelets. Ventral hairs much more numerous than dorsal hairs, about twice the mentioned diameter. Head not with a median suture, with acute thorny hairs like the spinal thoracic hairs. Antennae rather long, more than half as long as body with segment I as dark brown as the head, the other segments gradually darker towards segment VI which is mostly paler than segment I; segment VI always longer than segment V, the latter longer than segment IV which is $\frac{1}{3}$ — $\frac{2}{5}$ of segment III; segment VI with small, roundish imbrications which begin to become apparent on distal half of segment V; the rest smooth; secondary rhinaria variable in number; processus terminalis at base as wide as the part below the rhinaria, 2— $2\frac{1}{2}$ times as long as its basal width, $\frac{1}{3}$ — $\frac{2}{5}$ of the total length of the segment, with 8—11 short spiny hairs; hairs on segment III stiff, acuminate, the shortest only half basal diameter of the segment, most of them about equal to that diameter, the longest hairs $1\frac{1}{2}$ times that diameter. Rostrum long, reaching to about abdominal sternite VI or VII, with surprisingly short ultimate segments; segment IV with 6 hairs besides the 3 pairs at the junction of "IV and V"; about $1\frac{1}{2}$ times as long as its basal width; IV + V about $\frac{3}{4}$ of the length of second joint of hind tarsi. No trace of a mesosternal processus present. Siphuncular cones quite small, often inconspicuous, in diameter just smaller than the length of rostral segment IV, with only about 25 hairs of the ventral type. Cauda normal. Legs rather thick, with the femora dark to blackish brown with the very base pale, tibiae with dark bases and apices, on the fore and middle legs the middle part brownish yellow, on the hind tibiae somewhat paler just past the base, but the rest gradually darker towards apex; hairs on basal half of hind tibiae stiff and acuminate, considerably shorter than width of tibiae; first tarsal joints with very numerous hairs and two short spines, ventrally about $1\frac{2}{3}$ times as long as dorsally, 5 times as long as the width at the basal articulation; empodial hairs just over half as long as the sclerite on which they are placed.

Measurements in mm.

No.	Length of body	Ant.	Ant. segments				Diam. siph.	Cauda	Rhin. on		
			III	IV	V	VI			III	IV	V
1.	2.57	1.40	0.49	0.18	0.25	0.28	0.15	0.11	0 & 0	2 & 3	0 & 1
2.	2.83	1.55	0.57	0.20	0.26	0.30	0.16	0.11	3 & 3	2 & 2	1 & 0
3.	2.56	1.48	0.52	0.21	0.23	0.30	0.15	0.09	0 & 0	0 & 0	0 & 0
4.	2.47	1.39	0.51	0.17	0.23	0.28	0.14	0.08	0 & 0	0 & 0	0 & 0
5.	2.49	1.51	0.55	0.19	0.26	0.31	0.15	0.10	0 & 0	0 & 0	0 & 0
6.	2.51	1.40	0.49	0.19	0.23	0.29	0.14	0.11	0 & 0	0 & 0	0 & 0

(1—6, from *Pinus* (probably *wallichiana*, syn. *excelsa*), Murree (7000 ft), Pakistan, 3.VII.1964).

Discussion. The new species can easily be distinguished from other Palaearctic species by the combination of very small siphuncular cones with the unusually long antennal segment VI and short dorsal hairs.

Types. Holotype: apterous viviparous female (measurements no. 3), from *Pinus (wallichiana, syn. excelsa?)*, Murree (7000 ft), West Pakistan, 3.VII.1964 (R. VAN DEN BOSCH), no. P-3d. Paratypes: apterae viviparae with collecting data as for holotype.

Cinara maculipes spec. nov.

Apterous viviparous female.

In life pale brown. In mounted specimens head, pronotum and mesonotum somewhat mottled light brown; the small, roundish pleural intersegmental sclerites ("Muskelplatten") dark brown; the small siphuncular cones, an interrupted bar across tergite VIII and the subgenital plate pale brownish; no further pigmentation present. Dorsum medially with fields of very fine reticulation. Dorsal hairs very stiff and thorny, on the mesonotum spinally and marginally about half as long as basal diameter of antennal segment III, on the disc of the abdomen only $1/4$ — $1/3$ of that diameter, on tergite VIII as long as on mesonotum; hairs on sclerotic parts with a diffuse darker brownish zone around their bases, on membranous parts with dark sockets and a very small dark area around the socket. Ventral hairs also thorny, up to $1\frac{2}{5}$ times the mentioned diameter. Head with distinct, complete median suture, with hairs up to just longer than the mentioned diameter. Antennae about $2/5$ — $4/9$ of length of body, pale, with segment I light brown like the head, tip of IV, most of V and the whole of VI blackish brown; segment VI, and segment V distally imbricated, the rest smooth; for interrelation of segments see measurements; processus terminalis at base much (about $3/8$) thinner than part basad of the rhinaria, a little less than $1/3$ of the length of segment, with 9—12 thorns; secondary rhinaria mostly absent; only no. 3 of the measurements with 1 and 2 rhinaria on segment IV; antennal hairs thorny, the longest on segment III $4/5$ of basal diameter of the segment, but most of them much shorter. Rostrum reaching to abdominal sternite II or III; last joint short, "IV + V" only half as long as second joint of hind tarsi, with 6 long and fine hairs besides the 3 pairs at the junction of IV and V; V about $1\frac{1}{2}$ times as long as its largest width. No trace of a mesosternal processus. Siphunculi on slightly pigmented, small cones with a diameter as large as the length of rostral segment IV or less than $2/5$ the length of second joint of hind tarsi, with about 15—19 hairs most of which are long, fine and curved, but a few on the mesal side may be like dorsal abdominal hairs. Cauda rather long for the genus in comparison to its width, more or less low triangular with strongly bulging sides. Legs yellowish brown with the bases and apical parts of the tibiae darker to blackish brown, particularly the femora very conspicuously pantherine spotted, the tibiae to a lesser extent; hairs on the hind tibiae semiobtuse, on basal half $1/6$ — $1/5$ of the local diameter of the tibiae; first tarsal joints with 2—3 short ventral spines and a great number of longer hairs, ventrally $1\frac{2}{5}$ times as long as dorsally, $5\frac{1}{2}$ times as long as the width

at the basal articulation; empodial hairs about $2/3$ of the length of the sclerite on which they are placed.

Measurements in mm.

No.	Length of body	Ant.	Ant. segments				Diam. siph.	Cauda	Rhin. on IV
			III	IV	V	VI			
1.	4.60	2.00	0.85	0.26	0.35	0.28	0.20	0.26	0 & 0
2.	4.80	2.06	0.88	0.29	0.36	0.28	0.23	0.21	0 & 0
3.	4.77	2.06	0.89	0.29	0.34	0.28	0.23	0.25	1 & 2
4.	4.30	1.91	0.81	0.22	0.34	0.28	0.22	0.25	0 & 0
5.	4.19	1.96	0.83	0.30	0.32	0.28	0.20	0.27	0 & 0
6.	4.73	2.06	0.87	0.30	0.34	0.29	0.19	0.22	0 & 0

(1—6, from *Pinus wallichiana* (syn. *excelsa*), Murree, Pakistan, 3.VII.1964).

Alate viviparous female.

Described from one specimen. Head and thorax darker mottled brown. Dorsal hairs about 50% longer, slightly thinner, their sockets not darkened, not surrounded by brown. Antennal segment III with very unevenly sized rhinaria more or less in a row; hairs on segment III $7/10$ — $7/9$ of its basal diameter. Eyes slightly stalked, the stalk as high as the radius of the eye. Legs very dark with only a part near base of the middle and hind tibiae paler, the spotting not so conspicuous but still very distinct on transparent areas. Wings mutilated, venation uncertain, only subcosta and pterostigma very dark. Other characters as in apterae.

Measurements in mm.

No.	Length of body	Ant.	Ant segments				Diam. siph.	Cauda	Rhin. on		
			III	IV	V	VI			III	IV	V
1.	4.23	1.92	0.75	0.34	0.34	0.26	0.15	0.18	15 & 18	3 & 5	0 & 0

(with the above mentioned apterae).

Discussion. The strongly spotted legs, very small siphuncular cones, and very short hairs on abdominal dorsum and tibiae make identification of this species very easy.

Types. Holotype: apterous viviparous female (measurements no. 1), from *Pinus wallichiana* (syn. *excelsa*), Murree, West Pakistan, 3.VII.1964 (R. VAN DEN BOSCH), P-3c. Paratypes: apterae no. 2—6, and the alate viviparous female with collecting data as for holotype.

Epipemphigus gen. nov.

Fundatrix with four to five segmented antennae, without wax glands, without siphunculi, with 2—3 caudal hairs, with the empodial hairs very short, about $1/4$ — $1/3$ of the length of the claws; embryos inside fundatrices also with short empodial hairs, with wax glands. Alatae of the second generation both as larvae

and as adults with minute, unpigmented and therefore nearly invisible siphunculi, perhaps not always, with simple media in the fore wings, with very distinctly ciliate secondary rhinaria, with very irregular chaetotaxy of the first tarsal joints (e.g. 4, 4, 4; 4, 2, 4; 4, 2, 2, etc.); embryos inside these alatae with mouth parts, and with the empodial hairs at most $1/3$ of the length of the claws.

Type-species: *Pemphigus imaicus* Cholodkovsky, 1912.

Discussion. BÖRNER's (1952) subdivision of Pemphigine genera has the attraction of being very simple. By considering the lengths of the empodial hairs in new born offspring of fundatrigeniae (alatae of the second generation) he discerns two groups, those with short empodial hairs, the Pemphigini, and those with long empodial hairs, the Pachypappini. In BÖRNER & HEINZE (1957) one finds in addition that in Pemphigini the fundatrix and adult fundatrigeniae have long empodial hairs.

A check on empodial hairs in embryos of viviparae showed that the American *Paraprociphilus* Mordv. from *Acer* and *Alnus* indeed have the required very long empodial hairs, and that the Asiatic *Pemphigus baicalensis* Chol. is, like MORDVILKO (1929, 1935) suggested, a true *Paraprociphilus*. However, *Paraprociphilus ucrainensis* Mamontova, 1955, by the same standards is not a *Paraprociphilus* and, since KRZYWIEC (1962) showed that *Mimeuria ulmiphila* del Guercio is the same animal, this species should be placed not in *Paraprociphilus* Mordvilko, 1924, but in *Mimeuria* Börner, 1952.

The new genus unites a number of important characters of BÖRNER's Pachypappini with some characters of his Pemphigini. The fundatrix has no wax glands, which is typical for *Pachypappa* Koch and *Asiphum* Koch, but it has short empodial hairs. The embryos in fundatrigeniae have short empodial hairs, a character of Pemphigini, but also the fundatrix and fundatrigeniae have these short empodial hairs which as Pemphigini they should not have. The very markedly ciliate secondary rhinaria resemble to some extent the rhinaria with nodules, spinules or minute ciliae in some *Prociphilus* Koch and *Stagona* Koch, but again these taxa have embryos with long empodial hairs. Therefore there is no alternative but erecting a new genus for *Pemphigus imaicus* Chol. The species is here redescribed.

Epipemphigus imaicus (Cholodkovsky, 1912)

Fundatrix.

Colour in life unknown. In mounted specimens body oval-rounded, about 2.0—2.25 mm long. Head and sides of prothorax blackish sclerotic; the rest colourless and membranous, but stigmal plates, subanal plate and subgenital plate brown and the sockets of the dorsal hairs somewhat pigmented. No wax glands present. Dorsal hairs numerous, with long hairs of about 0.070—0.085 mm regularly arranged, but besides a great number of scattered shorter and thinner hairs of 0.040—0.070 mm long; the long hairs rather stout at base, but the apices of all hairs drawn out into very fine apices; the sockets of especially the long hairs distinctly pigmented; tergites VII and VIII both only with 4 long hairs of 0.08—0.11 mm long. Antennae as dark as the head, $1/6$ — $1/5$ of length of body, of

4 or 5 segments; in case of 5 segments the division between segments III and IV somewhat abnormal; processus terminalis distinct, about as long as its basal width, with a few rows of spinules that extend somewhat over the under and outer side of basal part of last segment; primary rhinaria with long ciliae, roundish; hairs on flagellum sparse, undulate, up to $1\frac{1}{2}$ times basal diameter of segment III. Rostrum reaching the middle coxae; apical joint about $\frac{9}{10}$ of second joint of hind tarsi, rather acute, or slightly rostrate, with only the 3 subapical pairs of hairs. Cauda inconspicuous, very broad, rather pale, with 2 long hairs. Rudimentary gonapophyses 2. Legs dark, short, thick; first tarsal joints with 2, 2, 2 hairs; tarsi dorsally and laterally not even imbricated, but the second joints with a very small number of spinules on their soles; empodial hairs short, $\frac{1}{3}$ — $\frac{1}{2}$ of the length of the claws.

Measurements in mm.

No.	Length of body	Ant.	Ant. segments		
			III	IV	V
1.	2.20	0.35	0.11	0.12	—
2.	2.07	0.34	0.10	0.11	—
3.	2.21	0.41	0.10	0.05	0.12
4.	2.01	0.39	0.09	0.05	0.13
5.	2.03	0.40	0.09	0.05	0.12

(1—5, from *Populus ciliata*, Murree (7000 ft), West Pakistan, 30.VI.1964).

Embryos in fundatrix.

Antennae of 4 segments. Wax glands on abdomen visible but pattern cannot be made out. Empodial hairs short, half the length of the claws. Antennae with few hairs, but on the very short processus terminalis with some 8—10 hairs, which hairs persist in the later larvae and in the adult.

Alate viviparous female (emigrant).

Colour in life not known. In mounted specimens head and thorax black but a triangular median part on the mesonotum paler to pale; abdomen without local sclerotisation. No wax glands present on head and thorax, but abdomen with small wax glands as follows: marginal ones on segments I—VII; no pleural ones; spinal ones, mostly strongly transverse, fragmented or consisting only of a few cells on tergites I—VI, irregularly present on most of these segments, and rarely also (a few cells only) on tergite VIII. Dorsal hairs inconspicuous, mostly not placed on the wax glands but quite near them, rather short, about 0.020 mm long. Antennae of 6 segments, about $1\frac{1}{2}$ —2 times as long as width of head through the eyes, $\frac{2}{7}$ — $\frac{1}{3}$ of length of body; segment III the longest, with 4—9 rather irregular very narrow rhinaria with wide rims on which rather long, very fine ciliae are implanted; IV with 2—5 rhinaria; V with 0—1, more rarely 2 secondary rhinaria and a primary rhinarium of very irregular shape, encircling about $\frac{2}{3}$ — $\frac{3}{4}$ of the circumference of the segment and covering, measured through the outer rim, about $\frac{2}{5}$ of its length, with little islands or peninsulae sticking out from the margin; segment VI without secondary rhinaria, with a primary rhinarium of

much the same shape and size as, or larger than that on segment V; these primary rhinaria with long, often furcated ciliae, and on the peninsulae sometimes with tree-shaped, many-branched ciliae; processus terminalis markedly thinner at base than in the middle, with 8—10 hairs near apex. Rostrum short, reaching to half-way the middle coxae; last segment acute, conical with slightly convex sides, just less than half as long as second joint of hind tarsi, with only the 3 subapical pairs of hairs. Siphunculi perhaps sometimes present, but not pigmented and so undeveloped that only irregularities in the microstructure indicate their presence. Cauda undeveloped, broad, with 2, sometimes 3 hairs. Legs dark to blackish, slender; the terminal spines of the tibiae not much different from the other hairs near their apex; first tarsal joints with 2—4 hairs, rarely with the same number on all legs, and with spinules; second tarsal joints with transverse lines of spinules, with about 5 pairs of ventral hairs; empodial hairs just less than half as long as the claws. Fore wings with simple media; the veins not bordered.

Measurements in mm.

No.	Length of body	Ant.	Ant. segments				Rhin. on segments		
			III	IV	V	VI	III	IV	V
1.	2.06	0.66	0.18	0.08	0.10	(0.14 + 0.04)	5 & 6	2 & 2	0 & 0
2.	2.00	0.68	0.18	0.10	0.10	(0.14 + 0.05)	6 & 7	2 & 3	0 & 0
3.	2.19	0.64	0.16	0.08	0.10	(0.14 + 0.05)	6 & 7	2 & 3	1 & 1
4.	2.10	0.70	0.18	0.10	0.11	(0.15 + 0.05)	6 & 7	2 & 3	0 & 1
5.	2.54	0.89	0.22	0.18	0.15	(0.16 + 0.05)	9 & 6	4 & 5	1 & 2
6.	2.44	0.81	0.22	0.13	0.12	(0.16 + 0.05)	9 & 9	4 & 5	1 & 2

(1—4, from *Populus ciliata*, Murree (7000 ft), West Pakistan, 30.VI.1964 (R. VAN DEN BOSCH); 5—6, from *Populus ciliata*, Muklisar, ubi?, 10.V.1930 (C. F. C. BEESON)).

Embryos in emigrants.

Antennae of 4 segments; primary rhinaria both transversely oval, twice as long as wide, that on IV twice as large as that on III; processus terminalis with 5 hairs. Wax glands very large, more or less rectangular with rounded angles, in the transverse rows (of probably 4 per segment) at only about 0.004—0.006 mm from each other, each with a hair. Empodial hairs about $1/3$ — $2/5$ of the length of the claws.

Discussion. CHOLODKOVSKY (1912) gave with the original description a drawing of the emigrants' antennae with their curious primary rhinaria, after material from Dehra-Dun, India. He writes that all the rhinaria are ciliate, but this has apparently escaped the notice of later authors. The gall which he also illustrates resembles that made by *Pemphigus populinigrae* Schrank on *Populus nigra*, irregularly sausage-like on the upperside of the leaf along the mid vein.

Globulicaudaphis gen. nov.

Apterous and alate viviparous females similar to each other in sclerotic pattern (paired, free, or partly fused spinal sclerites on abdominal tergites I—IV; mar-

ginal sclerites) with in apterae somewhat capitate, smooth-shafted hairs (4 spinals, 4 marginal ones on the mentioned tergites); these hairs in alatae with only faintly swollen apices. No dorsal processes present. Head normal, in apterae with the customary faint median suture, with little developed frontal tubercles. Antennae as in *Myzocallis* Pass., with processus terminalis longer than basal part of segment VI, with roundish, faintly ciliate secondary rhinaria in alatae but none in apterae. Triommatidia normal. Wings with normal venation. Siphunculi truncated-conical, fused with the marginal sclerite of tergite VI which bears 2—3 hairs. Cauda not knobbed but consisting of a large smooth membranous colourless bladder on the underside of which a pale, sclerotic, transversely oval, spinulose part with hairs is present. Subanal plate with two widely separated large lobes. Two rudimentary gonaphyses. Subgenital plate not pigmented, normal. First tarsal joints with 2 dorsal and 5 ventral hairs.

First instar larvae with only single pairs of spinal and marginal long knobbed hairs on abdomen, placed singly on dark sclerites. Antennae of 4 segments with

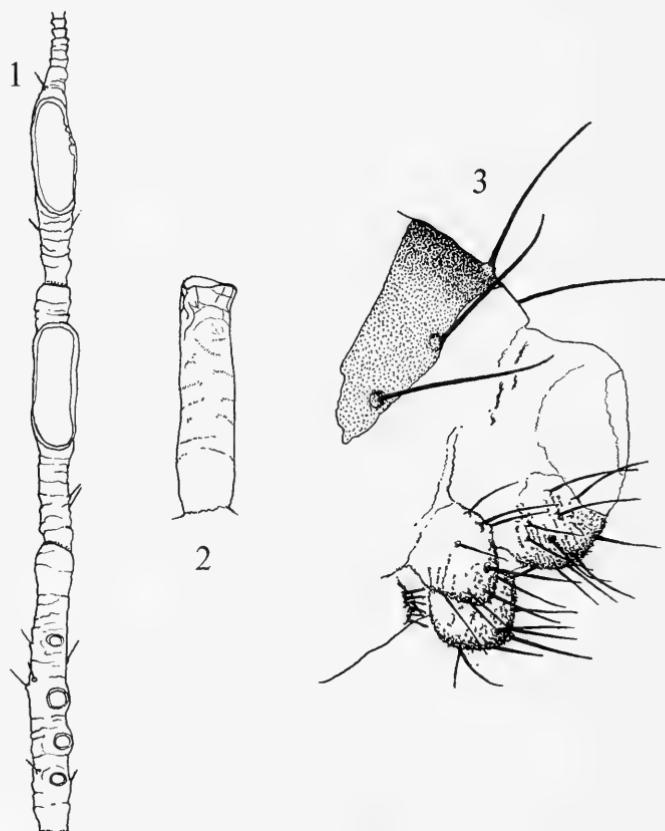


Fig. 1—2. *Ceruraphis eastopi* spec. nov., alate viviparous female. 1, ant. segments IV—VI, $\times 160$; 2, siphunculus, $\times 160$. Fig. 3. *Globulicaudaphis pakistanica* spec. nov., apterous viviparous female, posterior abd. segments, $\times 158$.

on segment III a pigmented spot where that segment subdivides at the next moult. Siphunculi free from the marginal sclerite of tergite VI.

Type-species: *Globulicaudaphis pakistanica* spec. nov.

Discussion. The genus differs from all described aphids by the structure of its anal tergite. There is a considerable resemblance in the sclerotic pattern to that of *Hoplochaetaphis* Aizenberg, 1959, but there the similarity ends. *Myzocallis* Passerini, 1860, is nearly related, and structurally quite close, but it may be separated at once by the caudal structure.

***Globulicaudaphis pakistanica* spec. nov.**

(Fig. 3, Pl. 2)

Apterous viviparous female.

Colour in life "basically pale greenish marked with a darker olive green dorsal pattern and with what appears to be white paired waxy markings running laterally from the head about $2/3$ the length of body. Legs pale with black knees, antennae pale, annulated with dark markings at joints". In mounted specimens (Pl. 2) anterior part of head pale, posterior middle part with a dark smoky area that is partly fused with a similarly pigmented square spinal area on the pronotum, divided in two by a fine membranous suture with halfway a transverse rhomboidal membranous hole; from mesonotum to abdominal tergite IV each segment with a spinal pair of rectangular to square, dark sclerites spinally separated by narrow membranous sutures, but on tergite IV with their posterior halves fused; similar marginal sclerites present on abdominal segments I—III, but segment IV with only the posterior halves of such sclerites; occasionally a few very small round pleural sclerites present on tergites I—IV; on tergite V an irregularly shaped spino-marginal transverse bar which is not connected with the siphunculi; tergites VI and VII with pairs of transverse spinal sclerites and traces of marginal sclerites; tergite VIII with a sclerotic transverse bar; the sclerites from mesonotum caudad slightly darker than those more cephalad, all with the margins darker than the centres. Dorsal hairs rather long, straight, up to 4 times as long as basal diameter of antennal segment III, with slightly widened blunt or knobbed apex, on moderate sockets; the mentioned spinal sclerites on mesonotum each with 3 hairs, from metanotum to tergite IV with 2 hairs, on tergites VI and VII mostly with 2, sometimes with 1 hair; marginal sclerites with 2 or 3 hairs; bar across tergite V with 18—24 hairs; tergite VIII with 8 hairs that may be up to $61/2$ times the mentioned diameter; pleural hairs irregularly present on tergites I—IV. Ventral hairs fine, acute and inconspicuous, mostly shorter than the mentioned diameter. Head normal, *Myzocallis*-like; antennae subequal in length to body, very pale with the apices of all segments but II, blackish; no rhinaria on segment III; hairs on inner side of segments I and II similar to those on vertex, but shorter; those on inner side of segment III still capitate but small and just shorter than basal diameter of the segment. Rostrum reaching to middle coxae; last segment rather short, subequal to second joint of hind tarsi, with 4—6 hairs besides the 3 subapical pairs. Siphunculi truncated-conical, as dark as the dorsal sclerites, with paler

base, approximately smooth, caudad fused with the marginal sclerite of tergite VI, that bears 2—3 hairs. Cauda, if it shrinks in mounts (Fig. 3), seemingly semi-circular with all the 8—12 hairs on the underside; if it does not shrink, cauda globular and the hairs ventrally on basal half. Subanal plate bilobed, the lobes at their bases far apart, curved inwards apicad. Two rudimentary gonapophyses. Legs quite pale with a dark smoky band around each femur a little basad the tip; tibiae spinulose near the tips, the hind tibiae spinulose over distal $1/3$ part; first tarsal joints ventrally with 5 hairs, dorsally with 2; empodial hairs strongly enlarged, flat.

Measurements in mm.

No.	Length of body	Ant.	Ant. segments				Siph.	Cauda
			III	IV	V	VI		
1.	1.79	1.63	0.39	0.31	0.31	(0.19 + 0.29)	0.06	0.13
2.	1.51	1.51	0.37	0.27	0.29	(0.18 + 0.28)	0.06	0.13
3.	1.74	1.62	0.45	0.31	0.29	(0.17 + 0.27)	0.06	0.12
4.	1.35	1.39	0.40	0.23	0.26	(0.15 + 0.25)	?	0.11

(1—4, from *Quercus dilatata*?, Murree (7000 ft), Pakistan, 30.VI.1964).

Alate viviparous female.

Described from one specimen. Vertex laterally pale, in the middle dark smoky, like: the middle portions of pronotum, the upper part of the meso- and metanotum, incised spinal bars across tergites I—IV, a spino-pleural bar, not touching the marginal sclerites, across tergite V, small paired spinal sclerites on tergites VI and VII, a narrow bar across tergite VIII and marginal sclerites on tergites IV—VI; the rest pale. Dorsal hairs shorter and thinner, blunt or with incrassate apices. Antennal segment III with 2 and 3 rather large roundish rhinaria near base. Wings with normal venation. The veins hardly visible; basal vein markedly bordered with dark brown; cubitus and three branches of media with dark brown dots at their tips; cubitus with a darkened, bordered base; stigma mostly colourless with the caudal margin bordered and with a large blotch near the base. Hind wings with a narrow dusky border along their apex. Other characters as in apterous female.

Measurements in mm.

No.	Length of body	Ant.	Ant. segments				Siph.	Cauda	Rhin. on III
			III	IV	V	VI			
1.	1.85	1.77	0.48	0.34	0.33	(0.19 + 0.29)	0.06	0.12	2 & 3

(with the apteræ viviparae).

Larvae.

First instar larvae with all the spinal hairs and most of the marginal hairs on dark sclerites; all the dorsal hairs at equal mutual distances, gradually increasing in length caudad from mesonotum; no pleural hairs present; antennæ of 4 segments; segment III with 2 hairs, IV with 1 hair.

Discussion. According to the collector, Dr. R. VAN DEN BOSCH, the species lives in colonies on the undersides of its host plant, *Quercus dilatata*? No ants were attending the aphids.

The species, apart from its cauda and the rather unusual abdominal sclerotisation, looks like a rather normal *Myzocallis*. In larvae the cauda has an almost normal appearance, but even in the first instar the two hairs on the cauda are distinctly on the underside, while in later instars the hairs seem to recede on the underside, because the upperside, almost invisible in dorsal view, protrudes more and more. During mounting the very thin upperside collapses. Afterwards the cauda in dorsal view looks semicircular and rather normal because the upperside is so transparent that the ventral, almost basal, position of the caudal hairs can hardly be detected.

Types. Holotype: apterous viviparous female (measurements no. 1), from *Quercus dilatata*?, Murree (7000 ft), 30.VI.1964 (R. VAN DEN BOSCH), P-30a. Paratypes: 11 apterae and one alata with collecting data as for holotype.

Hyadaphis coriandri (Das, 1918) and *H. tataricae* (Aizenberg, 1935).

A large sample of a small *Hyadaphis* collected near Murree (7500 ft), West Pakistan, 3.VII.1964, led to a closer study of the above two species. The resemblance between material of *coriandri* from various Umbelliferae from India to East Africa, and three samples of apterous *tataricae* from *Lonicera tatarica* from Russia and Poland is so great that they would seem to belong to the same species. The only difference that I could find is in the shape of the siphunculi which in apterous specimens from Umbelliferae usually slightly taper from the base over two-thirds of their length, while in my few specimens from *Lonicera* from Poland and Russia they tend to be wider in the middle than at their basal one-third part. In the Pakistan apterae the siphunculi are almost as in apterae from Umbelliferae, but the cauda is less thick, while in the alatae the rhinaria are more tuberculate and slightly larger than in alatae from Umbelliferae.

These facts suggest that, like *foeniculi* Pass., *H. coriandri* (Das) is a host alternating species, with *Lonicera tatarica* and probably other species of *Lonicera* (in the case of the Pakistan material a climbing one) as primary host plants, and various Umbelliferae as summer hosts. *Hayhurstia tataricae* Aizenberg, 1935, type-species of *Neohayhurstia* Aizenberg, 1954, appears to be a synonym of *Brevicoryne coriandri* Das, 1918, referred to *Hyadaphis* Kirkaldy, 1904. Other synonyms (HILLE RIS LAMBERS, 1948) are *Hyalopterus obscurus* Theobald, 1922, *Hyadaphis conica* Börner, 1932, and *Hyalopterus peucedani* Hall, 1932, and according to EASTOP (1958) also *Hyalopterus carii* Theobald, 1929, and probably *Hyalopterus albus* Monzen, 1929.

Liosomaphis atra spec. nov.

Apterous viviparous female.

In life dark purplish brown except centre of abdominal dorsum which is almost dirty greenish; legs and antennae pale, siphunculi dark on distal half. In mounted

specimens body shortly oval, about 1.30—1.60 mm long. Tergum blackish sclerotic with abdominal tergites I—VI solidly fused to a shield, which like the head, thoracic segments, and abdominal tergites VII and VIII is strongly wrinkled; the middle anterior part of the abdominal shield is often paler. Siphuncular base surrounded by a rather large membranous colourless area. Marginal tubercles apparently absent. Dorsal hairs short, subacute, on abdominal tergite III about half as long as basal diameter of antennal segment III, the 2 hairs on tergite VIII not much longer. Front with the broad, almost straight, middle part projecting beyond the insignificant frontal tubercles. Antennae pale with dark basal segments and somewhat dusky apex, about half as long as body; hairs on segment III about $\frac{1}{3}$ — $\frac{2}{5}$ of basal diameter of the segment. Rostrum long for the genus, reaching to or past the third pair of coxae; last segment about $\frac{9}{10}$ of second joint of hind tarsi, with 2 hairs besides the 3 subapical pairs. Siphunculi rather evenly pale, to dusky with pale base, about $\frac{1}{5}$ of length of body, twice the length of the cauda, with basal $\frac{2}{7}$ — $\frac{1}{3}$ consisting of an almost cylindrical stem which is $\frac{11}{4}$ times as thick as the hind tibiae; from the stem they abruptly increase in width to the middle of their length, to a maximum of about twice the width of the stem from where they more gradually decrease in width to the small flange where they are as thick as the hind tibiae; most of the swelling is, as usual, on the inner side; surface quite smooth with only at the very apex some transverse striae. Cauda cylindrical, or near base constricted, with distal half to one-third part tapering to the semiobtuse apex, of the colour of the distal part of the siphunculi, with 5 hairs. Legs pale to evenly pale brownish yellow; first tarsal joints with 3, 3, 3 hairs.

Measurements in mm.

No.	Length of body	Ant.	Ant. segments				Siph.	Cauda
			III	IV	V	VI		
1.	1.54	0.78	0.19	0.09	0.11	(0.11 + 0.16)	0.32	0.17
2.	1.46	0.74	0.18	0.10	0.10	(0.11 + 0.14)	0.32	0.15
3.	1.53	0.70	0.18	0.09	0.10	(0.10 + 0.13)	0.31	0.16
4.	1.57	0.81	0.19	0.11	0.11	(0.12 + 0.18)	0.33	0.18
5.	1.54	0.76	0.20	0.11	0.10	(0.11 + 0.13)	0.34	0.17
6.	1.36	0.64	0.16	0.07	0.09	(0.09 + 0.14)	0.29	0.14

(1—6, from *Berberis* sp., Murree (7000 ft), West Pakistan, 30.VI.1964).

Discussion. Recently some more *Liosomaphis* species have been described from Asia (*L. lydiae* Narzykulov, 1957, later made the type of *Berberidaphis* Narzykulov, 1960; *L. turanicus* Narzykulov, 1960; and *L. bimalayensis* Basu, 1964); all are pale insects, without strong sclerotisation of the dorsum. As to structure of siphunculi and cauda our species most strongly resembles *L. turanicus* Narzykulov, also in the length of the processus terminalis. In *L. bimalayensis* the antennae and the processus terminalis are absolutely and relatively longer. The rostrum of our new species is conspicuously longer than that in the other species in which it barely reaches past the middle coxae.

Types. Holotype: apterous viviparous female (measurements no. 1), from *Berberis* sp., Murree (7000 ft), West Pakistan, 30.VI.1960 (R. VAN DEN BOSCH), P-30b. Paratypes: apterous viviparous females with data as for holotype.

Macrosiphum pachysiphon spec. nov.

Apterous viviparous female.

In life very pale pink with black siphunculi. In mounted specimens body about 3.0—3.5 mm long. Tergum membranous and almost colourless with the exception of vague smoky roundish pleural intersegmental sclerites on abdomen and hardly more distinct antesiphuncular sclerites, but without marginal or postsiphuncular sclerites. Dorsal hairs numerous and conspicuous, stiff, blunt, on tergite III about $1\frac{1}{4}$ — $1\frac{1}{9}$ times as long as basal diameter of antennal segment III; marginal hairs quite numerous, tergite III often with 7—9 hairs on each side, tergite VIII with 8—10 hairs. Marginal tubercles small and flat, rather regularly present on tergites II—IV. Frontal tubercles strongly diverging, little developed; depth of frontal furrow only about $\frac{1}{6}$ — $\frac{2}{11}$ of the distance between the antennal bases, with flat to concave bottom; each frontal tubercle with 5—8 hairs, nearly all on the underside. Antennae pale with apex of segment III dusky, that of IV and V dark brownish black and the whole of VI blackish, about $\frac{7}{8}$ —1 times length of body; IIInd segment smooth with the very base imbricated, with 2—7 (average of 26 antennae: 4.0) curiously sunk rhinaria on slightly elevated parts of the segment near its base, and with numerous, some 30, hairs the longest of which are as long as basal diameter of the segment; processus terminalis $4\frac{1}{3}$ —5 times length of base of last segment. Rostrum reaching just past the middle coxae; last segment as in many *Sitobion* spp. somewhat constricted at base, not very blunt, rather short, about $\frac{2}{3}$ of second hind tarsal joint, with 4—7 hairs besides the 3 subapical pairs. Siphunculi very conspicuously black, thick, evenly tapering, at base $2\frac{1}{2}$ —3 times as thick as the hind tibiae, at apex $1\frac{1}{10}$ — $1\frac{1}{5}$ times as thick as that joint, about $\frac{1}{4}$ of length of body, superficially but sharply imbricated from base to about distal $\frac{1}{7}$ part which is distinctly reticulated, with very small flange, about $1\frac{4}{5}$ times as long as the cauda. Cauda pale, usually constricted at basal $\frac{1}{3}$ part, rather slender, bluntnish, with about 13—17 hairs. Legs long, pale with only the apices of the tibiae and the tarsi dark smoky; first tarsal joints with 3, 3, 3 hairs.

Measurements in mm.

No.	Length of body	Ant.	Ant. segments				Siph.	Cauda	Rhin. on III
			III	IV	V	VI			
1.	3.09	2.92	0.77	0.52	0.51	(0.17 + 0.71)	0.81	0.45	3 & 4
2.	3.49	3.09	0.83	0.61	0.51	(0.17 + 0.73)	0.89	0.52	5 & 6
3.	3.35	3.07	0.82	0.56	0.49	(0.17 + 0.79)	0.87	0.49	5 & 7
4.	3.14	2.77	0.76	0.49	0.44	(0.15 + 0.69)	0.87	0.48	2 & 3
5.	3.09	3.14	0.84	0.60	0.51	(0.16 + 0.78)	0.85	0.47	5 & 6
6.	3.01	3.03	0.83	0.54	0.51	(0.16 + 0.75)	0.88	0.46	3 & 4

(1—6, from *Rubus* sp., Murree (7000 ft), West Pakistan, 30.VI.1964).

Alate viviparous female.

Colour in life not known, but abdomen presumably as in apterae. In mounted specimens head and thorax brownish, the abdomen with an elaborate, smoky sclerotic pattern, consisting of irregularly fragmented spinal sclerites, bearing 1—3 hairs each, very small pleural sclerites, rather large transverse pleural inter-segmental sclerites and squarish marginal sclerites with many hairs. Antennae with the basal segments and the very base of segment III brownish like the head, the rest dark to black, but segment III usually distinctly blacker than segments IV and V; segment III with about 20—30 rhinaria that are larger and less sunken than in apterae, along one side of the segment, in irregular arrangement on basal half but in single file on distal half. Siphunculi more cylindrical and thinner than in apterae with distal $1/6$ part reticulated. Cauda thinner and more acute than in apterae. Legs with the femora blackish brown with pale base, tibiae brownish yellow with blackish apices. Wings with normal venation, but stigma elongated and the same dark or blackish colour as the subcostal vein system, so that the wings seem to have an anterior dark margin. Other characters more or less as in apterae viviparae.

Measurements in mm.

No.	Length of body	Ant.	Ant. segments						Siph.	Cauda	Rhin. on III
			III	IV	V	VI					
1.	2.96	3.17	0.83	0.64	0.53	(0.17 + 0.79)			0.69	0.37	19 & 27
2.	3.08	2.98	0.89	0.63	0.54	(0.16 + 0.74)			0.67	0.37	22 & 24
3.	2.71	3.08	0.73	0.67	0.50	(0.16 + 0.80)			0.61	0.30	24 & 28
4.	2.45	2.84	0.66	0.59	0.49	(0.15 + 0.73)			0.59	0.28	25 & 29

(1—2, with apterae no. 1—6; 3—4, from *Rubus lasiocarpus*, Shillong, Assam, India, 1964 (Commonwealth Inst. of Biol. Control)).

Discussion. According to Dr. R. VAN DEN BOSCH, who collected the Pakistan material, this aphid lives in tight colonies on the tender canes of the host plant. His sample consisted of apterae with two alatae, presumably of the second generation, but the sample from Assam consisted mainly of alatae with a few damaged apterae, of which unfortunately the date of collecting was not given.

In many respects this species resembles a *Sitobion*, e.g. by the last rostral segment, the black siphunculi, the sclerotic pattern of the abdomen in alatae, etc. But the long and very numerous hairs on body and antennae make it impossible to place it in *Sitobion* Mordv. The very pale integumentum of apterae with which the very thick black siphunculi strongly contrast distinguish the species from all known relatives. Alatae can easily be recognized by their very dark subcostal vein system and blackish pterostigma.

Types. Holotype: apterous viviparous female (measurements no. 1), from *Rubus* sp., Murree (7000 ft), West Pakistan, 30.VI.1964 (R. VAN DEN BOSCH), P-VI-30-j. Paratypes: apterous and alate viviparae with data as for holotype. Further material: numerous alatae and some damaged apterae viviparae from *Rubus lasiocarpus*, Shillong, Assam, India, 1964 (Commonwealth Inst. Biol. Control).

Matsumuraja capitophoroides spec. nov.

Apterous viviparous female.

In life pale yellow with only the apices of antennal segments III—V, the part near the primary rhinaria on VI, and the distal part of the processus terminalis dark to blackish. In mounted specimens body elongated oval, very variable in length, from 1.30 to 2.25 mm long. Tergum colourless, not visibly sclerotic but actually thickened and marginally with semiglobular papillae which in dorsal view look like small thick round to oval rings. Dorsal hairs thick (0.005 mm) and stiff, rather variable in length, so that the spinal hairs on abdominal tergite III are about 0.035 mm, the pleural hairs, if present, 0.030 mm, the hairs on tergite VIII about 0.065 mm; in large specimens (second generation) pleural hairs often all present from tergite I to VI, appearing as duplicated spinal hairs, but in small specimens sometimes nearly all pleural hairs absent; marginal hairs in single pairs on each of the anterior abdominal segments, similar to the spinal hairs; all dorsal hairs distinctly knobbed, placed on strong conical sockets which are on top of short processes which, including the socket, in the case of spinal hairs are about as long as the hair on top. Head, except on the middle of vertex, quite rough by small spinules, with markedly diverging frontal tubercles; depth of frontal furrow about $\frac{1}{7}$ of the distance between the antennae; numerous capitate hairs on strong sockets present on upper and under side of the head, also on the front and on the inner and under side of the frontal tubercles. Antennae $\frac{2}{3}$ — $\frac{7}{10}$ of length of body, pale with pigmentation as in the living insect; first segment on inner side with a sausage-shaped, quite blunt processus about as long as the segment, bearing 2—3 knobbed hairs; flagellum lightly imbricated; segment III with a few rather thin knobbed hairs of various length, the thickest of which are about $\frac{3}{7}$ of the diameter of the segment at its widened very base. Rostrum reaching just past the middle coxae; last segment with almost straight, sometimes just concave sides, just swollen near apex, and therefore not acute, about as long as second joint of hind tarsi, with 2 hairs besides the 3 subapical pairs, one of which is placed far basad. Siphunculi pale with only the very apex dusky, about $\frac{1}{4}$ — $\frac{2}{7}$ of length of body, lightly bluntly imbricated from base, but apical $\frac{1}{7}$ part smooth, cylindrical and about $1\frac{1}{2}$ times as thick as the hind tibiae, to just swollen on distal half where the diameter may be up to $1\frac{1}{10}$ times the smallest on basal half, slightly attenuated ($\frac{9}{10}$ of minimum width on basal half) just below the small flange, 3— $3\frac{1}{2}$ times as long as the cauda. Cauda pale, bluntly triangular with slightly convex sides, with 4 hairs. Legs rather long, pale with dusky tarsi; first tarsal joints with 3, 3, 2 hairs.

Measurements in mm.

No.	Length of body	Ant.	Ant. segments				Siph.	Cauda
			III	IV	V	VI		
1.	1.51	1.07	0.24	0.16	0.16	(0.10 + 0.30)	0.34	0.12
2.	1.49	1.12	0.26	0.15	0.19	(0.10 + 0.30)	0.39	0.12
3.	2.06	1.33	0.31	0.21	0.22	(0.12 + 0.33)	0.50	0.14
4.	1.97	1.39	0.31	0.21	0.23	(0.12 + 0.37)	0.49	0.14
5.	2.13	1.40	0.32	0.21	0.22	(0.12 + 0.37)	0.47	0.16
6.	2.12	1.41	0.33	0.22	0.22	(0.13 + 0.37)	0.51	0.15

(1—2, from *Rubus* sp., Murree (7500 ft), West Pakistan, 5.VII.1964; 3—4 as 1—2, but 27.VI.1964).

Discussion. According to Dr. R. VAN DEN BOSCH this species lives in often large colonies on the underside of the leaves of its host plant, a *Rubus* species that apparently also serves as host to *Macrosiphum pachysiphon* spec. nov., of which a sample was received from *Rubus lasiocarpus*. It would seem that this species does not have host alternation as suggested by TAKAHASHI (1959) for *Matsumuraja rubifoliae* Tak. The sample collected by Dr. VAN DEN BOSCH on 30.VI on *Rubus* consisted of apterae with one alatoid nymph. In a species with host alternation such a composition of the population on its secondary host would seem unlikely in that area at that time, because many other aphid species were only in their second generation. From samples received from other sources it appears that the species is widely distributed along the southern slopes of the Himalayas.

The present species can be distinguished from those species of which I have material available with the following key:

Key to *Matsumuraja* Schumacher (apterae viviparae)

- 1 (2). Antennal segment I at inner apex merely very angular or slightly protracted, not with a finger-shaped process that is much longer than its width halfway its length. On *Rubus peltatus*, Japan. . . . *M. sorini* Tak.
- 2 (1). Antennal segment I at inner apex with a long finger-shaped process that is longer than its width halfway its length.
- 3 (6). Abdominal tergites I—V without long capitate hairs on strong sockets or processes, and only the short marginal hairs on these tergites, though short, sometimes capitate. Tergites VII and VIII always with long capitate hairs on processes, and sometimes also tergite VI.
- 4 (5). Tergites VI—VIII with long capitate hairs. Siphunculi not or hardly swollen. Antennal segment III with the apical portion dark to blackish. On *Rubus palmatus*, Japan. *M. rubiphila* Tak.
- 5 (4). Tergites VII and VIII with long capitate hairs. Siphunculi thick, distinctly somewhat swollen. Antennal segment III with pale apex. On *Rubus* sp., Japan. *M. nuditerga* H.R.L.
- 6 (3). At least some spinal hairs on tergites I—V with capitate hairs on processes.
- 7 (8). Marginal processes very long, the posterior ones as long as the siphunculi, or rather two of the marginal processes are the siphunculi. On *Clethra*, Japan. According to TAKAHASHI (1959): fundatrices of: *M. rubifoliae* Tak.
- 8 (7). All marginal and spinal processes, if present, very much shorter than the siphunculi.
- 9 (10). Marginal processes on abdominal segments IV and V about as long as last rostral segment. Processus on antennal segment I very slenderly conical, almost pointed. On *Rubus* sp., Formosa. . . . *M. rubicola* Tak.
- 10 (9). Marginal processes absent, but the marginal hairs on strong conical

sockets. Processus on antennal segment I more cylindrical, or near apex thicker than halfway its length.

11 (12). Long spinal processes present which are more than 3 times as long as their width in the middle and on abdominal tergite VI nearly half as long as the siphunculi. On *Rubus*. Japan. . . . *M. rubi* Mats.
 12 (11). No long spinal processes present, but all the dorsal hairs on conical sockets, that together with the short processus are about as long as the hair on top.
 13 (14). Siphunculi with about distal $1/5$ part blackish, distinctly swollen, thicker at distal $1/3$ part than at basal $2/5$ part. Rostrum not with acutely triangular apical segment. Spinal hairs on abdominal tergites III—IV normally in single pairs. On *Rubus*. Japan. . . . *M. rubifoliae* Tak.
 14 (13). Like the preceding, but siphunculi with the apices hardly darker or only the very apex dusky, curved inwards, from the strongly tapering base almost completely cylindrical with a constriction at the tip. Rostrum with acutely triangular last segment. A few or all spinal hairs cephalad of the siphunculi duplicated. On *Rubus* sp. W. Pakistan.
 *M. capitophoroides* spec. nov.

In the above key *Matsumuraja formosana* Tak., 1925, is not considered because I have no authentic specimens. According to the description it resembles *M. capitophoroides* spec. nov. closely, but the spinal processes on the anterior abdominal tergites must be much larger, as long as or longer than the second antennal segment, while spinally additional capitate hairs may occur.

Types. Holotype: apterous viviparous female (measurements no. 1), from *Rubus* sp., Murree (7500 ft), West Pakistan, 5.VII.1964. Paratypes: apterous viviparous females with data as for holotype, and others collected on 27.VI.1964 and 30.VI. 1964.

Periphyllus vandenboschi spec. nov.

Apterous female.

Colour in life not known, but probably light green with pitch black siphunculi. In mounted specimens body about 1.35—2.00 mm long, rather slender. Tergum completely unpigmented with antennal segment I brown, and the apex of segment V and the whole segment VI dark to blackish. Hairs on dorsum numerous and long, the long spinal hairs on abdominal segment III 6—7 times as long as basal diameter of antennal segment III, with extremely fine apices. Front straight to just concave. Antennae $3/4$ — $7/8$ of length of body; hairs on segment III numerous, up to $5\frac{1}{2}$ —6 times basal diameter of the segment; base of segment VI with 2 hairs, the longest of which is about 0.12 mm, 14 times diameter of processus terminalis, $1\frac{1}{5}$ times the length of the basal part of the segment; the shortest of the two 0.09 mm; processus terminalis about as long as antennal segment III, 3—4 times basal part of segment VI. Rostrum reaching to the hind coxae; last segment rather thick and obtuse, just shorter than second joint of hind tarsi, with 4—7 hairs besides the 3 subapical pairs. Siphunculi deep black, $2/3$ of the second

joints of hind tarsi in length, cylindrical or with smallest width in the middle and there about 0.045 mm thick, only on the wide flange reticulated with one row of cells with sometimes one or two cells of a second row. Cauda pale, rather well developed, $1\frac{1}{2}$ — $2\frac{2}{3}$ times as long as its basal width, semioval to semicircular, not constricted at base, with many hairs. Legs pale with the tarsi dusky, rather slender; first tarsal joints with 5, 5, 5 hairs.

Measurements in mm.

No.	Length of body	Ant.	Ant. segments				Siph.	Cauda
			III	IV	V	VI		
1.	1.63	1.32	0.36	0.24	0.17	(0.09 + 0.34)	0.09	0.07
2.	1.58	1.29	0.36	0.21	0.17	(0.09 + 0.34)	0.09	0.07
3.	1.68	1.33	0.36	0.23	0.16	(0.11 + 0.35)	0.09	0.07
4.	1.93	1.48	0.39	0.26	0.21	(0.10 + 0.37)	0.09	0.07
5.	1.40	1.14	0.30	0.18	0.15	(0.09 + 0.32)	0.07	0.05
6.	1.84	1.44	0.38	0.24	0.20	(0.11 + 0.37)	0.08	0.07

(1—3, *Acer* sp., Murree (7500 ft), West Pakistan, 4.VII.1964; 4—6, idem but 27.VI.1964).

Larvae.

First instar larvae with the siphunculi black as in adults, all with long and fine hairs, without pleural hairs on abdomen, with 2 caudal hairs, with 4 hairs on the subanal plate; hairs on last antennal segment (fourth) as in adults.

Discussion. Two large samples of this aphid, consisting only of apterae viviparae and larvae were collected on the petioles of an *Acer* sp. near Murree. The Director of the Royal Botanic Gardens, Kew, England, most kindly supplied the information that the most likely *Acer* spp. in the vicinity of Murree would be *A. caesium* Wall. ex Brand, *A. villosum* Wall. or *A. pictum* Thunb. The aphid colonies were heavily attended by ants.

Very few *Periphyllus* species have only 5 hairs on the first tarsal joints normally, though this may occur in small specimens of some species that normally have 7 tarsal hairs. Characteristic for the adult apterae are the complete absence of local sclerotisation or pigmentation in contrast to the quite black cylindrical siphunculi, the embryos with normal hairs, and the length and interrelation of length of the two long hairs on the basal part of antennal segment VI. In most respects the species resembles *P. obscurus* Mamontova from *Acer campestre*, but that species has conical and slightly more reticulated siphunculi, pigmentation on the head and abdominal tergite VIII, faint sclerites at the bases of the dorsal hairs, and 7, 7, 7 hairs on the first tarsal joints. A nearly related species from Iran has normally 3, considerably longer, hairs on the basal part of last antennal segment, 7, 7, 7 hairs on the first tarsal joints, and aestivating larvae with foliate marginal hairs.

The species is named after Dr. R. VAN DEN BOSCH, Berkeley, California, who discovered this and nearly all the other species described in this paper.

Types. Holotype: apterous viviparous female (measurements no. 1), from *Acer*

sp., Murree (7500 ft), West Pakistan, 4.VII.1964 (R. VAN DEN BOSCH), P-VII-4a. Paratypes: many apterous viviparae with data as for holotype, and others collected on 27.VI.1964 (R. VAN DEN BOSCH), P-VI-27a.

Pseudessigella gen. nov.

Body elongated, narrow, with few hairs. Eyes without distinct triommatidia. Antennae in adults of 5 segments. Last rostral segment not subdivided, very short and blunt. Siphunculi, rimmed pores on a very small, hairless sclerite. Cauda rounded. First tarsal joints with 5 ventral hairs, in apterae not with dorsal hairs, those of hind legs ventrally $1\frac{1}{2}$ times as long as dorsally. Claws not with cleft apices.

Type-species: *Pseudessigella brachychaeta* spec. nov.

Discussion. The genus is nearly related to *Eulachnus* del Guercio. It lives like that genus on the needles of *Pinus* spp. It differs from *Eulachnus* in having 5 instead of 6 antennal segments and in that respect agrees with the American genus *Essigella* del Guercio which it also strongly resembles in the extremely short processus terminalis. It differs from *Essigella* in having claws with simple, acute apices.

Pseudessigella brachychaeta spec. nov.

Apterous viviparous female.

In life pale green. In mounted specimens body about 2.0—2.6 mm long, very elongated, about $3\frac{1}{2}$ times as long as its maximum width. Tergum membranous, with extremely small fuscous sclerites around the bases of the dorsal hairs, with similarly coloured roundish pleural and marginal intersegmental sclerites ("Muskelplatten") of about 0.02 mm in diameter, and with pleural, longitudinal groups of 2—3 irregular sclerites pigmented like the smoky stigmal plates. Dorsal hairs on abdominal tergite III about 14 in number, 8 of which are marginal, curved, with incrassate apex, only about 0.0125—0.017 mm long. Head pale brownish yellow, dorsally and frontally with hairs like the dorsal ones, ventrally with thin acute hairs of about 0.046 mm long. Front strongly convex. Antennae short and curved, evenly pale brownish yellow with slightly darker apex, $1/5$ — $1/4$ of length of body, about $1\frac{1}{3}$ times as long as the width of the head across the eyes, without secondary rhinaria; segment I and II smooth, but the other segments very inconspicuously imbricated; primary rhinaria of segment IV about equal to basal diameter of segment V, hardly larger than the primary rhinaria of segment V which is only $1/2$ of its diameter from the tip of the segment, and round in shape; hairs on segment III sparse, blunt, short, only half as long as the diameter of the segment as its narrowed base. Rostrum reaching beyond the middle coxae; apical segment very blunt, short, about $1/3$ of the second joint of hind tarsi, with only the 3 subapical pairs of hairs. Siphunculi small, only 0.02 mm in diameter, hardly elevated, placed on a pale brown hairless sclerite of about 0.042—0.046 mm in diameter. Abdominal tergite VIII consisting of one wide dusky sclerotic ring, with 16—18 very short hairs. Cauda semilunar, blunt, thick, over twice as wide as

long, with some 30 hairs of various lengths. Legs pigmented like the head, with the fore and middle femora very strongly swollen on basal $\frac{1}{4}$ part dorsally, ventrally almost straight; hind tibiae nearly twice as long as the middle tibiae; first tarsal joints elongate, those of hind legs ventrally $1\frac{1}{2}$ times as long as dorsally, $2\frac{1}{2}$ times diameter of the joint, with 3 (one short, two long) hairs ventro-apically and 2 hairs ventrally more basad; second tarsal joints only at the very apex darkened; claws slender and acute.

Measurements in mm.

No.	Length of body	Ant.	Ant. segments			Diam. siph.	Cauda
			III	IV	V		
1.	2.25	0.49	0.20	0.08	0.09	0.02	0.07
2.	2.44	0.52	0.21	0.09	0.10	0.02	0.07
3.	2.09	0.47	0.18	0.08	0.09	0.02	0.07
4.	2.17	0.52	0.20	0.08	0.10	0.02	0.07
5.	2.53	0.55	0.21	0.09	0.11	0.02	0.07
6.	2.43	0.51	0.20	0.09	0.10	0.02	0.07

(1—6, from *Pinus wallichiana* (*P. excelsa*), Murree, West Pakistan, 4.VII.1964).

Discussion. This aphid lives on the very long needles of the host plant, like members of the genera *Eulachnus* and *Essigella*. It is easy to distinguish the species from related aphids: no other species of this group is known with simple, sharp claws and five antennal segments.

Types. Holotype: apterous viviparous female (measurements no. 1) from *Pinus wallichiana* (*excelsa*), Murree, West Pakistan, 4.VII.1964 (R. VAN DEN BOSCH), P-VII-4d. Paratypes: apterae viviparae with data as for holotype.

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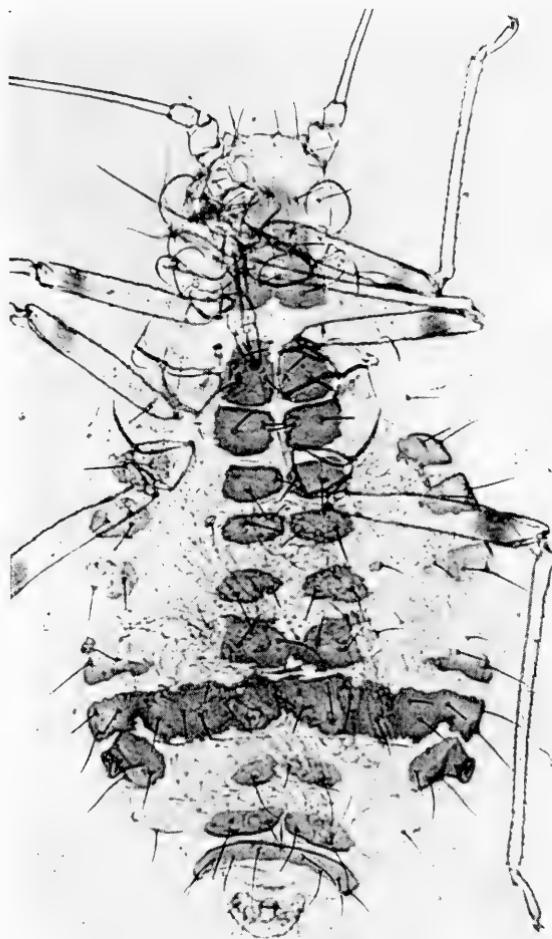


Plate 2. *Globulicaudaphis pakistanica* spec. nov., apterous viviparous female ($\times 9.5$)
(phot. by I.P.O., Wageningen)

D. HILLE RIS LAMBERS: *Aphids from Pakistan*

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B. J. LEMPKE. — Catalogus der Nederlandse Macrolepidoptera (Dertiende Supplement), p. 221—301, fig. 44—54, pl. 3—7.

Register van deel 109, p. 303.

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CATALOGUS DER NEDERLANDSE MACROLEPIDOPTERA (DERTIENDE SUPPLEMENT)

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ABSTRACT

This part of the catalogue contains the end of the subfamily Amphipyrinae and the subfamilies belonging to the group of the Quadrifinae, being the last part of the family Noctuidae.

The particulars for each species are given in the same sequence as in the preceding parts: time of appearance, discussion of the biotope(s), new localities and variation.

AMPHIPYRINAE (voortzetting)

Charanica Billberg

Charanica trigrammica Hufnagel. *Tijdschr. Entom.* 85 : 87; Cat. VII : (414). In het Hafdistrict en het westelijke deel van het Fluviaatiale District zijn enkele nieuwe vindplaatsen bekend geworden: Sexbierum (1964, STOBBE), Aerdt (1965, PEERDEMAN), Middelie (1952, DE BOER), Purmerend (1946, in aantal, HUISEN-GA), Capelle aan den IJssel (VERKAIK), Melissant (1959, HUISMAN). Waarschijnlijk zijn dit voor het grootste deel toch wel zwervers van de zandgronden, hetzij uit het duingebied (op Goeree komt de vlinder ook voor), hetzij dat zij behoorden tot een populatie van een nabij gelegen spoorbaan. Daarentegen schijnt de vlinder wel tot de fauna van het Amsterdamse Bos te behoren, daar hij hier vrij geregeld, doch niet in groot aantal, wordt gevangen (PEERDEMAN). Een merkwaardige vindplaats is ook Botshol (WOLSCHRIJN c.s.), hoewel dit moerasgebied meer „zandgrondsoorten” heeft opgeleverd. Overigens is aan de in 1943 gegeven verspreiding niets nieuws toe te voegen, ook niet wat het voorkomen op de wadden-eilanden betreft.

De vliegtijd kan al begin mei aanvangen. De vroegste datum is nu: 5.V, in 1963 waargenomen door Pater MUNSTERS te Stein, zodat de uiterste data nu worden: 5.V—27.VII.

Variabiliteit. De donkere vormen zijn over het algemeen zeldzaam en ontbreken op vele plaatsen zelfs volkomen. Van een toename is niets te bespeuren. Of ze dominant zijn, is zeer te betwijfelen. COCKAYNE vermeldt in *Ent. Rec.* 37 : 142 (1925) het resultaat van een kweek, afkomstig van een prachtig donker ♀. Geen enkel exemplaar van de F₁-generatie was donker. Zeer waarschijnlijk was de vorm dan ook recessief.

f. albescens Lenz, 1927. Exemplaren met zeer lichte haast witachtige voorvleu-

gels zijn zeldzaam. Nieuwe vindplaatsen: Aerdenhout (VAN WISSELINGH); Stein (Missiehuis).

f. erubescens Turati, 1909. Exemplaren met opvallend roodachtig gekleurde voorvleugels zijn evenmin gewoon. Nieuwe vindplaatsen: Frederiksoord, Heemskerk (Zoöl. Mus.); Stein (Missiehuis).

f. semifuscans Haworth, 1809. Exemplaren waarbij de voorvleugels vanaf de schaduwlijn duidelijk donkerder zijn dan de basale helft (plaat 3 fig. 1), werden nog aangetroffen te: Holten (LUKKIEN); Zeist (GORTER); 's-Graveland (WESTERNENG); Den Haag, Oostkapelle, Vijlen (Zoöl. Mus.); Stein (Missiehuis, VAN DE POL).

f. fuscolimbata nov. De voorvleugels verdonkerd vanaf de tweede dwarslijn tot de achterrand. Plaat 3 fig. 2. Twello, ♂, 2.VI.1938 (holotype), Vijlen, ♂, 1963 (Zoöl. Mus.); Nieuwkuik, ♂, 1952 (DIDDEN); Montfort, ♂, 1960 (MAASSEN).

[Fore wings darkened from the postmedian to the outer margin.]

f. paradoxa nov. Grondkleur van de voorvleugels donkerbruin, maar de ruimte tussen eerste dwarslijn en schaduwlijn lichtbruin, zodat een brede lichte middenband ontstaat. Plaat 3 fig. 3. Stein, ♂, 29.V.1960 (holotype, VAN DE POL). Een exemplaar van 1961 in de collectie van het Missiehuis aldaar.

[Ground colour of the fore wings dark brown, but the area between central shade and postmedian pale brown, so that a broad pale central band results.]

f. brunnea Lenz, 1927. De vorm met eenkleurig donker bruinachtige voorvleugels met min of meer duidelijke dwarslijnen werd verder bekend van: Apeldoorn (LEFFEF); Warnsveld (CARON); Ruurlo (LUKKIEN); Babberich (ELFRINK); Slijk-Ewijk, Rijckholt, Eijs (VAN DE POL); Zeist (GORTER); Oostvoorne (LUCAS); Geulem, Eperheide, Vijlen (Zoöl. Mus.); Stein (Missiehuis); Gronsveld (VAN AARTSEN).

f. obscura Tutt, 1891. De vorm met donkere zwartachtig grijze voorvleugels met meestal slechts twee dwarslijnen werd nog aangetroffen te: Holten (LUKKIEN); Twello, Doetinchem, Gronsveld, Eperheide, Vijlen (Zoöl. Mus.); Eibergen (VAN WESTEN); Babberich (ELFRINK); Amersfoort (CARON); Oostvoorne (LUCAS); Stein (Missiehuis).

(De donkere vormen worden dus vooral in het oosten en zuidoosten van het land gevonden en niet zelden beide op dezelfde vindplaatsen).

f. pallidalinea Tutt, 1891. Eenkleurig donkere exemplaren, waarbij de eerste en tweede dwarslijn opvallend licht afgezet zijn, werden gevangen te: Twello, Berg en Dal (Zoöl. Mus.); Hoog-Keppel (LEFFEF); Stein, Rijckholt (VAN DE POL). Blijkbaar vrij zeldzaam.

f. basivolata Wihan, 1917. Van de vorm waarbij de halve en de eerste dwarslijn langs de voorrand van de voorvleugels met elkaar verbonden zijn door een donkere lijn, werden de volgende nieuwe vindplaatsen bekend: Colmschate, Hoog-Keppel, Bussum, Rotterdam, Geulem (Zoöl. Mus.).

f. approximata Haworth, 1809. Exemplaren, waarbij de schaduwlijn en de eerste dwarslijn elkaar aan de binnenrand van de voorvleugels sterk naderen, zijn

stellig niet zeldzaam. Nieuwe vindplaatsen: Amerongen (GORTER); Amsterdam, Heemskerk, Eperheide (Zoöl. Mus.); Wassenaar (VAN WISSELINGH); Leiden, Oostvoorne (LUCAS); Rijckholt (VAN DE POL).

f. *convergens* Wihan, 1917. Van de vorm, waarbij schaduwlijn en eerste dwarslijn elkaar aan de binnenrand raken, werden enkele nieuwe vindplaatsen bekend: Zeist (GORTER); Heemskerk (Zoöl. Mus.).

f. *fasciata* Krombach, 1920. Een exemplaar met duidelijk verbreide midden-schaduw is afgebeeld op plaat 3 fig. 4. Nieuwe vindplaatsen: Noordlaren, Heemstede, Stein (VAN DE POL); Havelte (VAN DER MEULEN); Wilp (TER LAAG); Woudenberg, Bunnik (CARON); Zeist (GORTER); Heemskerk (AUKEMA); Oostvoorne (LUCAS); Deurne (NIES); Eperheide (Zoöl. Mus.). Blijkbaar een vrij verbreide vorm.

[KROMBACH writes: "Mit auffallend verbreiteter Mittelbinde", with strikingly widened central band. In my opinion this means that it is the central shade which is widened, not the central area ("Mittelfeld" in German). TURNER's translation "with extraordinarily wide band" in Brit. Noct., suppl. 1 : 322 (1934) is not exact.]

f. *obsoleta* Lempke, 1943. Een eenkleurig donkerbruin exemplaar van Doetinchem mist alle dwarslijnen (VAN WISSELINGH).

f. *renata* Lenz, 1927. Nieuwe vindplaatsen van exemplaren met donker gerande niervlek: Putten (Zoöl. Mus.); Bennekom (VAN DE POL).

f. *oculata* Wihan, 1917. Nieuwe vindplaats van exemplaren met donker gevulde niervlek (die dan in de schaduwlijn ligt): Leiden (LUCAS).

Dwerg. Blaricum (BERGMAN).

Teratologisch exemplaar. Linker achtervleugel te klein. Ermelo (BRANGER).

Hoplodrina Boursin

Hoplodrina alsines Brahm. *Tijdschr. Entom.* 85 : 96; Cat. VII : (423). Van de waddeneilanden is de soort nu bekend van Schiermonnikoog (VAN WISSELINGH), Terschelling (gewoon, LEFFEF, TANIS) en Vlieland (CAMPING). Overigens is aan de in 1943 opgegeven verbreiding van de haast overal gewone vlinder niets nieuws toe te voegen.

De uiterste data van de vliegtijd blijven bijna ongewijzigd: 3.VI—16.VIII.

Variabiliteit. f. *suffusa* Tutt, 1891. De vorm met sterk verdonkerde vleugels is niet zeldzaam en komt vrij verbreid onder de soort voor.

f. *elegans* Lempke, 1943. Exemplaren met helder geelbruine scherp getekende voorvleugels werden nog aangetroffen te: Borne (VAN WESTEN); Apeldoorn (Zoöl. Mus.); Heemstede (VON HERWARTH); Hendrik-Ido-Ambacht (BOGAARD).

(f. *rufescens* Lempke, 1943. Moet vervallen. Het exemplaar behoort zonder twijfel tot *Hoplodrina blanda*; de roodachtige tint is geheel verdwenen. De twee soorten zijn naar de genitaliën niet met zekerheid te determineren.

f. *bimaculata* nov. Voorvleugels met scherp afstekende geheel donker gevulde ronde en niervlek. Plaat 3 fig. 5. Zeist, ♂, 8.VII.1949 (holotype, GORTER).

[Upper side fore wings: orbicular and reniform completely filled with a dark colour (black-brown), strongly contrasting with the ground colour.]

f. centrifasciata nov. Voorvleugels met opvallend donkere middenschaduw. Plaat 3 fig. 6. Slijk-Ewijk, ♂, 13.VI.1960 (holotype, VAN DE POL); Eindhoven (VAN DER WOLF).

[Fore wings with strikingly dark central shade.]

f. clausa Lempke, 1943. Behalve het holotype van Twello (♂, 8.VII.1930), dat zich nu in het Zoöl. Mus. bevindt, zijn geen andere exemplaren bekend geworden. Bij deze vorm raken eerste en tweede dwarslijn elkaar aan de binnenrand. Zie plaat 3 fig. 7.

Dwerg. Gronsveld (Zoöl. Mus.).

Hoplodrina blanda Schiff. *Tijdschrift Entom.* 85 : 94; Cat. VII : (421). Al is de minder bont getekende soort over het algemeen niet zo gewoon als de vorige, uit de combinatie van beide lijsten van vindplaatsen blijkt wel, dat hij toch in vrijwel het gehele land is aan te treffen, evenmin zonder duidelijke voorkeur voor een of meer bepaalde biotopen. De vlinder is nu bekend van drie van de waddeneilanden.

De vliegtijd kan tot begin september duren. De uiterste data zijn nu: 12.VI—6.IX. De laatste datum werd in 1951 genoteerd door LANDSMAN.

Vindplaatsen. Fr.: Terschelling, Vlieland, Leeuwarden, Tjerkwerd, Friens, Olterterp, Wijnjeterp, Oosterwolde, Nijetrijne, Oudemirdum, Rijs. Gr.: Borgercompagnie, Ter Borgh. Dr.: Donderen, Eelde, Zuidlaren, Eext, Schoonlo, Odoorn. Ov.: Volthe, Saasveld (Molenven), Rijssen, Holten, Rechteren, Raalte, Abdij Sion, Deventer, Zwartsluis, Vollenhove, Marknesse. Flevoland: Lelystad. Gdl.: Ermelo, Hulshorst, Epe, Wiessel, Hoog-Soeren, Uchelen, Empe, Laag-Soeren, Hoenderlo, Wageningen, Eefde, de Voorst, Wientjesvoort, Ruurlo, Hoog-Keppel, Loerbeek, Babberich, Aerdt; Berg en Dal, Ingen, Slijk-Ewijk. Utr.: Soesterberg, Maarsseveen, Hollandse Rading, Botshol. N.H.: 's-Graveland, Blaricum, Naarden, Bussum, Kortenhoef, Weesp, Zaandam, Wormerveer, Middelie, Hoorn, Den Helder, Egmond aan Zee, Heilo, Heemskerk, Velzen, Aerdenhout. Z.H.: Noorden, Reeuwijk, Oegstgeest, Wassenaar, Meijendel, Voorschoten, Leidschendam, Staelduin, Vlaardingen, Capelle aan den IJssel, Arkel, Gorkum, Schelluinen, Hendrik-Ido-Ambacht, Oostvoorne, Middelharnis, Melissant, Ouddorp. Zl.: Burgh, Haamstede, Westenschouwen, Oostkapelle, Valkenisse, Zoutelande, Goes, Groede, Cadzand. N.B.: Sint Michielsgestel, Haaren, Best, Nuenen, Bergeijk, Someren, Deurne, Helenaveen, Sint Anthonis, Gassel. Lbg.: Geijsteren, Sevenum, Griendseveen, Grubbenvorst, Swalmen, Roggel, Montfort, Stein, Heerlerbaan, Kerkrade, Geulem, Bunde, Cannerbos, Gronsveld, Bocholtz, Vijlen, Vaals.

Variabiliteit. *f. suffusa* Prout, 1895. Op het ogenblik is de donker bruinige vorm de overheersende vorm van het ♀ geworden. Bij het ♂ komt hij daarentegen veel minder voor (in het Zoöl. Mus. slechts vijf exemplaren van Doetinchem, Amsterdam, Oostkapelle en Valkenisse). Plaat 3 fig. 8. Een extreem ♂ met bruinzwarte voorvleugels van Melissant (HUISMAN).

f. redacta Haworth, 1809. Exemplaren met zuiver grijsachtige voorvleugels nog van Apeldoorn, Wiessel, Valkenisse en Vijlen (Zoöl. Mus.); Leiden (LUCAS).

f. pallidior Lenz, 1927. Een goed exemplaar met licht grijsbruine onduidelijk getekende voorvleugels van Slijk-Ewijk (VAN DE POL) is afgebeeld op plaat 3 fig. 9.

f. bimaculata nov. Voorvleugels met scherp afstekende geheel donker gevulde ronde en niervlek. Plaat 3 fig. 10. Lelystad, ♂, 1.VII.1961 (holotype, VAN DE POL).

[Upper side fore wings: orbicular and reniform completely filled with a dark colour, strongly contrasting with the ground colour.]

Dwerg. Epen (VAN WISSELINGH).

Hoplodrina ambigua Schiff. *Tijdschr. Entom.* 95: 278; *Cat. XI*: (889). Het is nu wel duidelijk, dat deze soort in de loop van de veertiger jaren van onze eeuw zijn areaal in noordelijke richting heeft uitgebreid en daarbij ook ons land heeft bereikt. Daar hij elk jaar in de trekverslagen is opgenomen, is het niet moeilijk een goede indruk te krijgen van het verloop van het voorkomen hier te lande. Na de vangst van het eerste exemplaar in 1946 werd *ambigua* pas weer in 1949 gemeld, nu in acht stuks. Maar reeds de drie volgende jaren vloog het aantal omhoog tot 110, 280 en 223 stuks. In 1954 en 1955 vielen de totalen terug tot resp. 98 en 64 stuks, maar beslist slecht waren 1956, '57 en '58 met 17, nul en 16 stuks, zodat het er op begon te lijken, dat de vlinder zich hier op de duur niet zou kunnen handhaven. Doch het jaar daarop kwamen we weer tot bijna 200 stuks. Opvallend goed waren 1961 en 1962 met 2863 en 2388 getelde exemplaren. 1963 bracht het slechts tot 135 stuks, maar 1964 was weer veel beter (480 stuks). Zeer slecht was 1965 (38 stuks). Er zijn dus sterke schommelingen in de aantallen, die voor een belangrijk deel wel veroorzaakt worden door oecologische factoren.

Hoewel de vlinder op verscheidene plaatsen benoorden de grote rivieren is waargenomen, is toch wel duidelijk geworden, dat hij zich ten zuiden ervan het beste thuis voelt. Hier wordt hij het regelmatigst waargenomen en hier zijn de aantallen in de regel ook het grootst.

De vliegtijd kan in de tweede helft van mei beginnen en nog voortduren tot in oktober. De uiterste data zijn nu: 21.V—10.X. Ongetwijfeld komen er twee generaties voor, waarvan de grens in juli ligt. Alle jaren bij elkaar geven echter geen scherpe scheiding meer te zien, hoewel die er in de afzonderlijke seizoenen in de regel wel is.

Op de waddeneilanden is *ambigua* tot nog toe alleen op Terschelling aange troffen (1956, LEFFEF). De in 1953 vermelde vindplaats Leeuwarden bleek later onjuist te zijn. Overigens volgt hierna een volledige lijst van alle plaatsen, waar de vlinder tot nog toe is waargenomen, zonder verdere biezonderheden, daar die in de trekverslagen te vinden zijn.

Vindplaatsen. Fr.: West-Terschelling, Nijetrijne. Ov.: Deventer. Gdl.: Wiessel, Apeldoorn, Wageningen, Bennekom; Gorssel, Eefde, Warnsveld, de Voorst, Rekken, Hackfort, Aalten, Hoog-Keppel (Ulenpas), Groessen; Hatert, Slijk-Ewijk. Utr.: Zeist, Utrecht. N.H.: Amsterdamse Bos, Castricum, Heemskerk, Overveen, Aerdenhout. Z.H.: Leiden, Den Haag, Staelduin, Oostvoorne, Nieuw Helvoet, Hellevoetsluis, Melissant, Ouddorp. Zl.: Burgh, Westenschouwen, Oostkapelle, Valkenisse, Goes, Cadzand. N.B.: Hoogerheide, Chaam, Oostelbeers, Best, Eindhoven, Nuenen, Deurne. Lbg.: Plasmolen, de Hamert, Arcen, Griendseveen, Sevenum, Grubbenvorst, Velden, Venlo, Tegelen, Steijl, Swalmen, Maasniel, Roggel, Moesel, Roermond, Maalbroek, Melick, Sint Odiliënberg, Montfort, Echt, Sittard, Stein, Brunssum, Heerlen, Chrèvremont, Kerkrade, Geulem, Neercanne, Sint Pietersberg, Cadier, Gronsveld, Rijckholt, Epen, Vijlen, Vaals.

Variabiliteit. f. *brunnescens* Lempke, 1953. Exemplaren met bruin grijze voorvleugels werden verder nog bekend van: Oostvoorne (LUCAS); Melissant (HUISMAN).

f. obscura nov. Grondkleur van de voorvleugels sterk verdonkerd. Plaat 3 fig. 11. Wageningen, Slijk-Ewijk, ♀, 13.VII.1960 (holotype, VAN DE POL); Burgh (GORTER); Bergeijk, Epen (VAN WISSELINGH); Maalbroek (Mus. Rotterdam); Montfort (BOGAARD).

[Ground colour of the fore wings strongly darkened.]

f. protensa nov. Ronde vlek wortelwaarts uitgerekt tot de eerste dwarslijn. Maasniel, ♂, 13.IX.1960 (holotype, Mus. Rotterdam).

[Orbicular lengthened in the direction of the base and touching the antemedian.]

f. juncta nov. Ronde vlek en niervlek raken elkaar. Melissant, ♀, 4.IX.1960 (holotype, HUISMAN).

[Orbicular and reniform touch each other.]

f. benesignata nov. Bovenzijde voorvleugels met scherpe donkere eerste en tweede dwarslijn. Aalten, ♂, 28.VIII.1950 (holotype, VAN GALEN); Melissant, ♂, 12.VI.1962 (HUISMAN).

[Fore wings with sharp dark antemedian and postmedian.]

Dwergen. Melissant (HUISMAN); Oostkapelle (Zoöl. Mus.).

Spodoptera Guenée

Spodoptera exigua Hübner. *Tijdschr. Entom.* 85 : 104; *Cat. VII* : (431). Het voorkomen in Nederland, zoals wij dat tot nog toe kennen, demonstreert weer duidelijk, dat voor verschillende soorten de laatste 20 jaar een gunstiger periode is aangebroken, die hen in staat stelt veel verder noordwaarts te komen, dan dat daarvoor het geval was, ook al houden we rekening met het intensievere vangen in de moderne tijd. Na de eerste vangst in 1868 duurde het tot 1937, vóór de soort weer in ons land gesignaleerd werd, terwijl het volgende jaar zelfs tien stuks gevangen werden. 1941 leverde één waarneming, maar vanaf 1944 tot nu is de vlinder in meer dan de helft van het aantal jaren hier te lande aangetroffen. In de regel echter is het aantal exemplaren klein, maar een enkele keer komt het boven de tien (1952 met 13, 1958 met 14). Alles overtuwend echter was het jaar 1962, toen hier niet minder dan 227 stuks geteld werden, die tussen 5 mei en 20 oktober voor het grootste deel in het westen van het land werden waargenomen. Deze immigratie hing duidelijk samen met de Britse. Onze overburen bereikten echter een totaal van 746 stuks, wat ook voor hen een record betekende dat vooral veroorzaakt werd door de gunstiger ligging van de Engelse zuidkust.

Exceptioneel was de vangst van een exemplaar op 3 maart 1952 (VAN WISSELINGH). Ook blijkens de Engelse ervaring is dat jaar de migratie zeer vroeg begonnen. Soms worden de aanvliegers in mei waargenomen (1958, 1962, 1964) of in juni (1946, 1962, 1964). Juli-vangsten zijn evenmin gewoon (1868, 1937, 1938, 1952, 1962, 1964), maar komen blijkens het aantal jaren dat ze plaats vonden, toch wat meer voor. Augustus echter is nu wel duidelijk de beste maand voor de soort. In verschillende jaren is de vlinder ook in september gevangen en zelfs

in oktober. De kroon echter spant het jaar 1963, toen maar één enkel exemplaar werd gemeld, en wel op 9 november! In alle jaren, dat er vroege immigranten werden waargenomen (maart, mei, juni), werden ook later in het seizoen weer exemplaren gevangen. Dit is een aanwijzing, dat het dier zich hier in de zomer althans één generatie kan voortplanten. Niets wijst er echter op, dat *exigua* in staat zou zijn ook wel eens onze winter door te komen. Na het topjaar 1962 kwam in het volgende jaar alleen de ene november-vangst!

In het volgende overzicht zijn alle vindplaatsen na 1943 vermeld met de jaren van waarneming zonder verdere biezonderheden. Deze zijn steeds in de trekvlinderverslagen te vinden.

Vindplaatsen. Fr.: Sexbierum (1962). Dr.: Ruinen (1962). Ov.: Holten (1952). Flevoland: Lelystad (1962). Gd.: Ede (1948), Dieren (1962); Warnsveld (1947); Buren (1962). Utr.: Zeist (1959). N.H.: 's-Graveland (1958), Amsterdamse Bos (1962), Halfweg (1962, 1966), Middelie (1949), Heemskerk (1962), Overveen (1964), Aerdenhout (1946, 1947, 1952, 1958), Heemstede (1956). Z.H.: Leiden (1952), Staelduin (1952), Arkel (1962), Hendrik-Ido-Ambacht (1964), Oostvoorne (1958, 1962, 1964), Melissant (1958, 1966), Ouddorp (1966). Zl.: Haamstede (1962), Burgh (1962), Westenschouwen (1962), Oostkapelle (1962, 1964), Valkenisse (1962, 1964). N.B.: Best (1962), Bergeijk (1962), Deurne (1944, 1945, 1946). Lbg.: Belfeld (1964), Swalmen (1958, 1959), Stein (1958, 1962, 1964), Heerlerbaan (1958), Schaesberg (1952), Epen (1958).

Variabiliteit. De grondkleur van de voorvleugels varieert van een lichter tot een donkerder grijs. De ronde vlek heeft soms nauwelijks een donkerder kern, meestal is deze donker bruinachtig, soms is de kern mooi roodbruin en kan de vlek vrijwel geheel vullen. Al deze verschillen gaan echter zo geleidelijk in elkaar over, dat het met het thans beschikbare materiaal vrijwel onmogelijk is bepaalde vormen te onderscheiden. De reeds beschreven vormen kon ik onder het Nederlandse materiaal niet terug vinden.

Dwergen. Heemskerk, Haamstede (Zoöl. Mus.).

[*Spodoptera littoralis* Boisduval. *Tijdschr. Entom.* 85: 104; *Cat. VII*: (431), noot 1. Van deze adventief is nog altijd slechts het ene exemplaar bekend, dat in 1922 uit een te Alkmaar in geïmporteerde bananen gevonden rups werd gekweekt.

VIETTE heeft aangetoond, dat *Sp. litura* Fabricius, 1775, en *Sp. littoralis* Boisduval, 1834, twee verschillende soorten zijn, praktisch alleen te onderscheiden aan het genitaalapparaat. De eerste soort komt voor in zuidoost-Azië, op Java, in Australië, op Nieuw Caledonië en op de Fidsji eilanden. De tweede is bekend van grote delen van Afrika, van Spanje, het zuiden van Frankrijk en van Syrië. Zie *Bull. Soc. Linn. de Lyon* 32: 145—148, 1963. In Frankrijk werd *littoralis* voor het eerst omstreeks 1935 te Parijs aangetroffen. De soort is daarna in vele exemplaren op verschillende plaatsen in het zuiden van de Basses Alpes tot de Pyreneën gevangen en is er mogelijk geacclimatiseerd (DUFAY, 1962, *Alexanor* 2: 207).

In *Proc. Trans. South London ent. nat. Hist. Soc.* 1963: 48 (1964) wordt meegedeeld, dat *littoralis* op chrysanten in kassen in de zuidelijke helft van Engeland is aangetroffen, waar het dier een ernstige plaag kan zijn, daar het in staat is zich het hele jaar door in de kassen voort te planten en de rups van tal van planten kan leven, o.a. van sla en tomaten.

Ook in Denemarken is de rups herhaaldelijk ingevoerd, met bloemen uit Italië, met bananen, met sla van de Canarische eilanden (in 1953 zelfs meer dan 40 rupsen) (HOFFMEYER, De Danske Ugler, 2de druk: 247, 1962).

Uit al deze gegevens blijkt wel, dat nieuwe rupsvondsten in Nederland beslist niet uitgesloten zijn. Het enige tot nu toe bekende Nederlandse exemplaar behoort inderdaad tot *littoralis*. Het is afgebeeld op plaat 4 fig. 8.]

Caradrina Ochsenheimer

Subgenus Caradrina Ochsenheimer

Caradrina (Caradrina) morpheus Hufnagel. *Tijdschr. Entom.* 85 : 94; Cat. VII : (421). Met uitzondering van Texel, waar hij ongetwijfeld ook zal voorkomen, is de vlinder nu van alle waddeneilanden bekend. Op Rottum ving DIDDEN in 1959 twee exemplaren. Overigens is aan de in 1943 opgegeven verspreiding niets toe te voegen.

Wat de vliegtijd betreft, na de publicatie van Cat. VII is gebleken, dat *morpheus* niet zelden een (partiële) tweede generatie kan voortbrengen. De vliegtijd van de eerste kan iets eerder beginnen en wordt nu: 9.V (in 1959 genoteerd, LUCAS) tot 7.VIII. De tweede is waargenomen van eind augustus tot in de tweede helft van oktober (30.VIII—21.X). Hij werd vermeld in 1949, 1953, 1959, 1960 en 1961. Vooral 1959 met zijn zeer droge en zonnige zomer en herfst leverde veel gegevens op. Uit dit jaar stammen ook de beide uiterste data van deze generatie. (In 1950 trof VAN WISSELINGH op 24 februari een vers exemplaar in zijn huis aan. Dit had zich daar ongetwijfeld wel ontwikkeld).

Variabiliteit. De typische vorm met niet al te donkere voorvleugels blijkt de hoofdvorm te zijn, ook bij het moderne materiaal.

f. *ochracea* Lenz, 1927. De vorm met licht geelbruine voorvleugels komt niet veel voor. Nieuwe vindplaatsen: Zeist (GORTER); Halfweg (VAN AARTSEN, in Zoöl. Mus.); Zaandam (WESTERNENG); Bergeijk, Epen (VAN WISSELINGH); Oisterwijk (LUCAS); Eindhoven (VAN DER WOLF).

f. *fuscomarginata* nov. Bovenzijde voorvleugels: de ruimte tussen tweede dwarslijn en achterrand sterk verdonkerd. Ruurlo, ♂, 6.VII.1961 (holotype, LUKKIELEN); Ratum (PEERDEMAN); Zeist (GORTER); Hendrik-Ido-Ambacht (BOGAARD); Ouddorp (VROEGINDEWEIJ).

[Upper side fore wings: the area between postdiscal and outer margin strongly darkened.]

f. *spalleki* Kitt, 1917. Van deze vorm, waarbij ook het wortelveld verdonkerd is, zijn geen nieuwe vangsten bekend geworden.

f. *obscura* Tutt, 1891. De vorm met bruinzwarte of zwartachtige voorvleugels is vrij gewoon, vooral onder het moderne materiaal, maar is over het geheel gerekend zeker niet de hoofdvorm.

f. *semiconfluens* Lempke, 1943. Exemplaren, waarbij ronde vlek en niervlek smal met elkaar verbonden zijn, werden nog aangetroffen te: Vledder, Den Haag (Zoöl. Mus.); Bennekom (VAN DE POL); Aalten (VAN GALEN); Zeist (GORTER); Leiden (VAN DER WOLF); Oostvoorne, Eperheide (LUCAS); Melissant (HUISMAN); Nuenen (NEIJTS); Epen (VAN WISSELINGH).

f. *confluens* nov. Ronde vlek en niervlek samengesmolten tot één vlek. Zeist, ♂, 15.VII.1960 (holotype, GORTER); Ouddorp, ♂, 1962 (HUISMAN).

[Orbicular and reniform coalescent, so forming one large spot.]

f. *tangens* Lucas, 1960, *Ent. Ber.* 20 : 230. De eerste en de tweede dwarslijn ontmoeten elkaar even boven de binnenrand van de voorvleugels en lopen dan weer uit elkaar. Oostvoorne (LUCAS).

f. *brevipennis* nov. Voor- en achtervleugels duidelijk te kort. Hendrik-Ido-Ambacht, ♀, 4.VI.1956 (holotype, BOGAARD).

[Fore and hind wings distinctly too short.]

Dwergen. Odoorn, Amsterdam, Someren (PEERDEMAN); Marknesse, Wageningen (VAN DE POL); Zaandam (AUKEEMA); Maarheeze (VERHAAK); Chèvremont (LUKKIEN).

Subgenus **Paradrina** Boursin

Caradrina (Paradrina) selini Boisduval. *Tijdschr. Entom.* 85 : 93; Cat. VII : (420). Er kan niet de minste twijfel aan bestaan, dat de soort bij ons inheems is. De vlinder is vooral in het Duindistrict en op enkele waddeneilanden aangetroffen, maar is ook bekend van vrij veel vindplaatsen in het oosten en zuiden van het land, waar hij toch wel in hoofdzaak beperkt is tot de zandgronden. Hier is hij overall schaars.

Het areaal in het omringende gebied is zeer verbrokkeld. In Denemarken is de vlinder bekend van de eilanden Bornholm (hier verbreed) en Anholt (niet zeldzaam), terwijl in 1932 een exemplaar bij Skagen in het noorden van Jutland gevangen werd. Uit het aan ons land grenzende Duitse gebied ken ik alleen een vermelding van Bremen (in 1952, JÄCK, 1953, *Bombus* 1 : 322). In België is *selini* alleen bekend van de Kempen, hoofdzakelijk van Sutendaal, volgens mededeling van de heer DE LAEVER. Op de Britse eilanden is de soort nooit aangetroffen.

De vliegtijd kan in de laatste week van mei beginnen en voortduren tot in de eerste week van augustus (27.V—4.VIII). De vroegste datum werd in 1951 te Amerongen vastgesteld (BENTINCK), de laatste in 1962 (Westenschouwen, LEFFEF). Bij uitzondering blijkt ook bij deze soort nu en dan een zeer partiële tweede generatie te kunnen voorkomen (8 september 1961, twee exemplaren te Burgh, LEFFEF).

Vindplaatsen. Fr.: Terschelling (betrekkelijk gewoon, LEFFEF), Vlieland. Gd.: Wageningen; Winterswijk. Utr.: Amerongen, Zeist, Soest. N.H.: Schoorl, Egmond aan Zee, Heemskerk, Heemstede. Z.H.: Meijendel, Staelduin, Rotterdam (Kralingerhout), Arkel (1963, ZWAKHALS), Ouddorp. Zl.: Burgh, Westenschouwen, Oostkapelle. N.B.: Bergen op Zoom, Schijf, Kampina, Bergeijk, Deurne, Someren. Lbg.: De Hamert, Geijsteren, Sevenum, Swalmen, Heel, Buchten, Brunssum, Meerssen.

Variabiliteit. BOISDUVAL beschreef de soort naar materiaal uit het Zuid-zwitserse kanton Valais (Wallis) en gaf er de volgende diagnose van: „alnis anticis argenteo-cinereis, strigis obscurioribus, macula reniformis strigaque fulgurali rufo-ferrugineis: alae posticae cinereae, ad basin dilutiores”. Zijn holotype is afgebeeld door CULOT (Noct. et Géom. d'Europe 1, pl. 46 fig. 15). In overeenstemming met de beschrijving heeft het exemplaar lichtgrijze voorvleugels met twee duidelijk afstekende donkere dwarslijnen. Ook de niervlek steekt goed af. Voor de golflijn staat een rij donker roodbruine pijlvlekken. Exemplaren uit de Basses Alpes (zuid-Frankrijk) uit de collectie-CARON stemmen ermee overeen (plaat 4 fig. 1—3).

De Nederlandse exemplaren behoren niet tot deze nominaatvorm. De meeste

hebben donkergrijze voorvleugels, sommige zijn wat lichter van tint, maar vrijwel alle hebben een zeer onduidelijke tekening (fig. 4—6).

Onze populaties komen daarentegen goed overeen met die van Pommeren, zoals URBAHN die beschrijft (*Stett. ent. Z.* 100 : 594, 1939). De oudste naam hiervoor is *milleri* Schultz (1862, *Ent. Z. Stettin* 23 : 367), beschreven als een van *clavipalpis* verschillende soort, die bij Misdroy aan de Oostzeekust gevangen werd. Ook daar variëren de vlinders van een lichter tot een donkerder grijs en zijn ze bijna alle zeer onduidelijk getekend.

[The Dutch populations do not belong to the nominate form, described by BOISDUVAL after a specimen from the Swiss canton Valais and figured by CULOT (l.c.). Our specimens differ by having indistinctly marked fore wings with the ground colour varying from a paler to a darker grey. Cf. plate 4, figs. 1—6.

The oldest name for this indistinctly marked subspecies is *milleri* Schultz, 1862, described as a species after some specimens from Misdroy near the coast of the Baltic in the former German province of Pommern. URBAHN gives an excellent description of this subspecies (1939, l. c.), clearly showing that it perfectly corresponds with our Dutch populations.]

Caradrina (Paradrina) clavipalpis Scopoli. *Tijdschr. Entom.* 85 : 91; Cat. VII : (418). Met uitzondering van Texel (waar de vlinder ook wel zal voorkomen) en Rottum is *clavipalpis* nu bekend van alle waddeneilanden. Overigens is aan de in 1943 opgegeven verspreiding niets toe te voegen.

De vliegtijd, die in Cat. VII werd gegeven (3.IV—24.XII), blijkt nog te beperkt geweest te zijn. Wij kennen nu vangsten uit alle maanden van het jaar. Op 22 januari 1946 werd een gaaf ♂ binnenshuis te Steijl aangetroffen (Broeder ANTONIUS). 12 februari (jaar?) vond KNOOP een exemplaar binnenshuis te Almelo. Op 26 februari 1961 ving TER LAAG een gaaf exemplaar te Bussum op licht. Op 25 maart 1953 werd door VAN GALEN een volkomen vers dier te Aalten gevangen. Op 1 april 1962 ving TER LAAG een exemplaar te Hilversum. Op 7.IV. 1948 vond GORTER een volkomen gaaf exemplaar te Zeist. Maar natuurlijk blijven wintervangsten uitzonderingen. Overigens zijn we nog niet veel wijzer dan in 1943.

Variabiliteit. f. quadripunctata Fabricius, 1775. Exemplaren, waarbij het franjeveld van de voorvleugels opvallend verdonkerd is, zijn niet gewoon, maar komen toch vrij verbred onder de soort voor.

f. paradoxa nov. Niet alleen het franjeveld, maar ook het wortelveld van de voorvleugels verdonkerd. Het middenveld steekt dus licht af. Stein, ♂, 18.IX.1958 (holotype, Missiehuis).

[Upper side fore wings: basal area and marginal area darkened, central area contrasts as a pale band.]

f. obscura Prout, 1895. Exemplaren met geheel verdonkerde voorvleugels zijn vrij gewoon, zowel bij ♂, als bij ♀.

f. pallida Lempke, 1943. Exemplaren met opvallend lichtgrijze voorvleugels komen veel minder voor. Bolsward, Den Haag (Zoöl. Mus.); Wassenaar (VAN WISSELINGH); Montfort (MAASSEN).

f. bimaculata nov. Voorvleugels met scherp afstekende geheel donker gevulde ronde en niervlek. Plaat 4 fig. 7. Wageningen, ♂, 2.VII.1953 (holotype, VAN DE POL).

[Upper side fore wings: orbicular and reniform completely filled with a dark colour, strongly contrasting with the ground colour.]

f. *obsoleta* Lempke, 1943. Exemplaren zonder dwarslijnen op de voorvleugels werden nog bekend van Havelte (VAN DER MEULEN); Deventer (LUKKIEN); Wiessel, Weesp (Zoöl. Mus.); Bennekom (VAN DE POL).

f. *distincta* nov. Voorvleugels met scherpe zwarte dwarslijnen. Nuenen, ♀, 28.VIII.1959 (holotype) en ♂, 5.IX.1959 (NEIJTS).

[Fore wings with sharp black transverse lines.]

f. *signata* nov. De golflijn over de gehele lengte aan de binnenzijde opvallend donker afgezet en daardoor scherp afstekend. Sittard, ♂, 13.VII.1949 (holotype, DIEDEREN).

[The submarginal line of the fore wings bordered on its inner side by a striking dark line and therefore sharply contrasting.]

Dwergen. Naardermeer (Zoöl. Mus.); Amsterdamse Bos (PEERDEMAN); Den Helder (LUCAS); Haarlem, Wassenaar (VAN WISSELINGH); Eindhoven (VAN DER WOLF).

Chilodes Herrich-Schäffer

Chilodes maritima Tauscher. *Tijdschr. Entom.* 84 : 342; Cat. VI : (390). De vlinder blijkt inderdaad verbreider te zijn dan in 1941 bekend was, hoewel hij uiteraard beperkt blijft tot min of meer vochtige terreinen, waar riet groeit. Toch valt het aantal nieuwe vindplaatsen niet mee, al kunnen bij de 10 van 1941 nu 34 nieuwe gevoegd worden, waarbij zelfs één van de waddeneilanden. Op de meeste vindplaatsen is het dier vrij schaars, wat mogelijk echter meer schijn dan werkelijkheid is.

De vliegtijd blijkt vrij lang te zijn. De vroegste datum is nu 10 juni (1948, Meerssen, RIJK), maar de vlinder is waargenomen tot eind augustus en zelfs tot ver in september toe: 25.VIII.1959, Hendrik-Ido-Ambacht (BOGAARD), 2.IX. 1956, Groessen (VAN DE POL), 28.IX.1941, een klein exemplaar. Botshol (PIET). Mogelijk is hier een enkel exemplaar van een dan wel zelden voorkomende (partiële) tweede generatie bij.

Vindplaatsen. Fr.: Terschelling (enkele exemplaren in West-Terschelling in 1956, LEFFEF), Sexbierum, Leeuwarden, Eernewoude, Nijetrijne (gewoon, LEFFEF). Ov.: Vollenhove. Gdl.: Ermelo, Apeldoorn, Lunteren; de Voorst, Korenburgerveen, Groessen; Hater, Buren. Utr.: Botshol. N.H.: Hilversum, Naardermeer, Weesp, Muiderberg, Hoorn, Castricum, Aerdenhout. Z.H.: Spijk, Arkel, Schelluinen, Hendrik-Ido-Ambacht, Oostvoorne, Melisasant. Zl.: Haamstede (enkele, LEFFEF). Lbg.: Sevenum, Griensveen (gewoon tijdens het Rivon-onderzoek, LEFFEF), Moesel, Montfort, Stein, Meerssen, Rijckholt.

Variabiliteit. TAUSCHER beeldt zijn exemplaar van *Noctua maritima* af met grijze voorvleugels, waarop de donkere aderen duidelijk afsteken en zijn beschrijving is met deze figuur in overeenstemming („Alae anticae cinerascentes venosae“) (1806, *Mém. Moscou* 1 : 211, pl. XIII, fig. 5). Weinig Nederlandse exemplaren komen hiermee overeen. Wel bezitten veel exemplaren grijze

voorvleugels, maar de donkere adertekening is zelden zo sterk als door TAUSCHER beschreven en afgebeeld wordt. Zijn exemplaar werd in 1805 aan de Oostzeekust in Koerland gevangen en het is mogelijk dat de soort daar sterker getekend is dan bij ons. Zo lang hierover niets bekend is, lijkt het me het beste alle exemplaren met grijze voorvleugels zonder afwijkende tekening als typisch te beschouwen. Niet zelden is deze grijze tint met iets bruin gemengd, zodat overgangen naar *f. ulvae* ontstaan.

f. ulvae Hübner, [1818—1819]. HÜBNER beeldt twee verschillende vormen af onder deze naam. De eerste (fig. 635, 636) die uiteraard de prioriteit heeft, is een vorm met lichtbruine voorvleugels, waarbij het achterrandsveld echter grijs is (althans bij het exemplaar van de „Sammlung” in de bibliotheek van de Ned. Ent. Ver.). Een dergelijke *maritima* heb ik nooit gezien. Voorlopig zou ik de naam willen gebruiken voor alle exemplaren met bruine voorvleugels, zoals SOUTH er ook één afbeeldt in de oude editie van „British Moths”. Het merkwaardige is, dat deze vorm onder het moderne Nederlandse materiaal nauwelijks meer voorkomt! Zelfs overgangs-exemplaren met bruin-grijze voorvleugels zijn schaars (bijv. Lunteren, BRANGER). In de collectie van het Zoöl. Mus. bevinden zich alleen enkele exemplaren van Zevenhuizen met zuiver bruine voorvleugels. Dat dit verkleurde dieren zouden zijn, die oorspronkelijk grijs waren, is uitgesloten.

f. bipunctata Haworth, 1812. Vrij geregeld in een enkel exemplaar onder de soort. Nieuwe vindplaatsen: Leeuwarden, Eernewoude (CAMPING); Nijetrijne (LEFFEF); Ermelo (VAN DER MEULEN); Apeldoorn, Buren, Kortenhoef (Zoöl. Mus.); Hoorn (KUCHLEIN).

f. wismariensis Schmidt, 1858. Exemplaren met de zwarte lengtestreep zijn veel zeldzamer. Ermelo (VAN DER MEULEN); Groessen (VAN DE POL); Kortenhoef (Zoöl. Mus.); Melissant (HUISMAN).

f. nigristriata Staudinger, 1871. Is naast de door TAUSCHER afgebeelde vorm nauwelijks te handhaven.

Dwerg. Rijckholt (VAN DE POL).

Athetis Hübner

Athetis gluteosa Treitschke. Alleen enkele malen in het zuiden van Limburg aangetroffen. Of de soort hier nu inheems is, of dat we met nu en dan vanuit België tot in ons land doordringende exemplaren te doen hebben, is op het ogenblik moeilijk uit te maken. Daarvoor wordt in dit gebied op te weinig plaatsen intensief verzameld. Enkele Nederlandse exemplaren zijn afgebeeld op plaat 4 fig. 9 en 10.

In Denemarken en het omringende Duitse gebied is *gluteosa* nergens aangetroffen. De dichtstbij bekende Duitse vindplaats is het Mombacher Wald bij Mainz, waar de vlijnder omstreeks 1850 werd gevangen (RÖSSLER, 1881, Fauna Wiesbaden). Overigens slechts bekend van Karlsruhe (1952). Wijlen Dr. G. WARNECKE verstrekte mij nog deze gegevens. In België is *gluteosa* alleen in het bergachtige oosten gevangen. HACKRAY vermeldt Aye-Marche-en-Famenne (in het noorden van Belgisch Luxemburg) (1947, Rev. franç. Lép. 11 : 19) en voor zover ik kon nagaan, is dit de enige bekende Belgische vindplaats van deze eeuw.

(DERENNE kende alleen een oude vangst van Han-sur-Lesse, zie zijn „Addenda” etc.: 77, 1928). Op de Britse eilanden is de soort nooit gevonden.

Alle Nederlandse exemplaren werden in juli gevangen (11.VII—24.VII).

Vindplaatsen. Lbg.: Stein, ♀, 11.VII.1963 (Missiehuis); Epen, ♀ 24.VII.1954, ♀ 18.VII.1955, drie mannetjes 18.VII.1955 (VAN WISSELINGH).

Athetis pallustris Hübner. *Tijdschr. Entom.* 85 : 103; Cat. VII : (430). De vlinder blijft een zeer lokale soort in ons land, wat wel duidelijk blijkt uit het feit, dat bij de zes vindplaatsen, die in 1943 bekend waren, slechts negen nieuwe gevoegd kunnen worden. Opvallend is het voorkomen op één van de waddeneilanden en in het Duindistrict. Het behoeven dus zeker geen uitgebreide moerassige terreinen te zijn, die de soort als biotoop nodig heeft. Wel natuurlijk plaatsen, waar de voedselplant van de rups, de moerasspiraea, groeit.

In Denemarken schijnt de vlinder minder zeldzaam geworden te zijn. In de 2de druk van De Danske Ugler (1962, p. 257) vermeldt HOFFMEYER tenminste, dat in 1944 een flink aantal exemplaren op Seeland gevangen is, terwijl vooral sinds 1950 vrij veel nieuwe vondsten bekend geworden zijn. In België is *pallustris* nog steeds niet aangetroffen. Mogelijk is hierdoor te verklaren, waarom de vlinder nog nooit in de zuidelijke helft van ons land gevangen is. Een interessant artikel over de biologie en het voorkomen in Engeland werd gepubliceerd door EDELSTEN, FRYER en ROBINSON (1944, *Entomologist* 77 : 49 etc.).

De vliegtijd kan al half mei beginnen en tot in de tweede helft van juli voortduren. De nu bekende uiterste data zijn: 18.V—20.VII (de laatste datum in 1965 te Wijnjeterp, G. DIJKSTRA).

Vindplaatsen. Fr.: Vlieland, ♂, 10.VI.1951 (CAMPING); Wijnjeterp, juli 1965 (G. DIJKSTRA). Dr.: Roden, 18.V.1946 (BLOM); Assen, ♂, 8.VI.1954 (VAN DE POL); Ruinen, 6.VI.1960 (VAN DER MADE & VIS). Ov.: Balkbrug, 7.VI.1966 (LEFFEF); Raalte, 29.V.1956 (FLINT); Olst, 24.V.1949 (KUCHLEIN); Marknesse, 11.V.1961 (VAN DE POL). N.H.: Heemskerk, 31.V.1959, 23.V (twee exemplaren) en 24.V.1961 (VAN AARTSEN); Overveen, ♂, 9.VI.1964 (LEFFEF).

Agrotis Hübner

Agrotis venustula Hübner. *Tijdschr. Entom.* 85 : 104; Cat. VII : (431). De vlinder komt niet alleen in het oosten en zuiden voor, maar ook op zandgronden in het noorden, is op een van de waddeneilanden aangetroffen en blijkt tevens vrij verbred in het Duindistrict te zijn. Hoewel *venustula* in het goede biotoop geregeld is aan te treffen, is het dier toch maar zelden werkelijk gewoon.

De vliegtijd kan iets langer duren dan in 1943 werd opgegeven. De uiterste data worden nu: 15.V—19.VII. Aanmerkelijk hier buiten valt een vangst op 4.VIII. 1962 te Westenschouwen (LEFFEF), blijkbaar een extreem laat exemplaar.

Vindplaatsen. Fr.: Terschelling, verscheidene exemplaren in 1956 en 1957 (LEFFEF), Eernewoude, Beetsterzwaag, Fochteloo, Appelscha, Nijetrijne. Gr.: Glimmen, Dr.: Westervelde, Schipborg, Eext, Schoonlo, Hooghalen. Ov.: Saasveld (Molenvennen), Almelo, Rijssen, Balkbrug, Oud-Leusen, Zandbelt (Diepenveen). Gd.: Ermelo, Hulshorst, Vierhouten, Epe, Wiessel, Hoog-Soeren, Uchelen, Empe, Laag-Soeren, Hoenderlo, Kootwijk, Kootwijkerveen;

Gorssel, de Voorst, Warnsveld, Almen, Ruurlo, Winterswijk, Aalten, Hoog-Keppel; Slijk-Ewijk. Utr.: Amerongen, Leersum, Zeist. N.H.: Schoorl, Egmond aan Zee, Bakkum, Heemskerk, Overveen. Z.H.: Leiden, Meijendel. Zl.: Burgh, Haamstede, Westenschouwen, Cadzand. N.B.: Sint Michielsgestel, Gassel, Mill, Kampina, Bergeijk, Eindhoven, Valkenswaard, Somen, Helenaveen. Lbg.: Griendsveld, Sevenum, Roggel, Heel, Tegelen, Belfeld, Swalmen, Maasniel, Vlodrop, Montfort, Putbroek, Echt, Stein, Schinveld, Brunssum, Heerlerbaan, Geulem, Kannerbos, Cadier en Keer, Gronsveld, Rijckholt, Vijlen.

MELICLEPTRIINAE

Chloridea Duncan

Chloridea viriplaca Hufnagel, 1766 (*dipsacea* L., 1767). *Tijdschr. Entom.* 84 : 337; Cat. VI : (385). Het voornaamste biotoop van de vlinder blijkt het duingebied, zowel van het vasteland als van de waddeneilanden. Het tweede is het zuiden van Limburg en dan speciaal het Krijtdistrict. Buiten deze twee gebieden zijn behalve de paar reeds in 1941 vermelde vindplaatsen slechts enkele nieuwe bekend geworden.

Uit kweekresultaten is gebleken, dat er inderdaad twee generaties voorkomen. LUCAS ving 15 juni te Katwijk enige vlinders en vond twee rupsen op slangekruid, die 30.VI en 2.VII verpopten. In de tweede helft van juli kwamen beide poppen uit. In 1959 vond AUKEEMA te Egmond een rups op nachtsilene (*Silene nutans* L.). De vlinder daarvan kwam 4.VIII uit de pop. De hoofdvliegtijd valt ongetwijfeld in de maand juni. Van juli bezit ik op het ogenblik acht data, zonder duidelijk hiaat verspreid over de hele maand. Dan nog vijf in augustus en twee in mei. De reeds in 1941 vermelde aprildatum schijnt wel een grote uitzondering te zijn. Voor zover de gegevens het nu toelaten, kunnen we de twee generaties als volgt vaststellen: de eerste (bij uitzondering in april) de tweede helft van mei (20.V) tot in juli (16.VII nog?), de tweede van de tweede helft van juli tot de tweede helft van augustus (21.VII—20.VIII). Deze tweede generatie is waarschijnlijk slechts partieel.

Vindplaatsen. Fr.: Terschelling (TANIS), Vlieland (CAMPING). N.H.: Amsterdam (in 1952, 1958 en 1959 op opgespoten reeds begroeide terreinen, PEERDEMAN), Bergen aan Zee, Egmond aan Zee, Egmond aan den Hoef, Castricum, Heemskerk, Bloemendaal, Aerdenhout. Z.H.: Katwijk aan Zee, Meijendel, Voorschoten. N.B.: Nuenen, 29.VII.1948 (NEIJTS), Valkenswaard. Lbg.: Wittem, Epen.

Variabiliteit. f. pallida nov. Voorvleugels bleek met zeer zwakke tekening, achtervleugels normaal. Egmond, ♂, 28.VI.1964 (holotype, AUKEEMA).

[Fore wings pale with obsolete markings, hind wings normal.]

Dwergen. Overveen (WITMOND); Aerdenhout (VAN WISSELINGH).

Chloridea maritima Graslin. *Tijdschr. Entom.* 84 : 336; Cat. VI : (384). De vlinder is vooral verbreid in heidestreken, maar blijkt ook hier en daar in het Duindistrict voor te komen en is zelfs van één van de waddeneilanden bekend. Over het algemeen is hij niet gewoon.

De vliegtijd kan iets vroeger beginnen dan in 1941 bekend was. De uiterste data

worden nu: 20.V—18.VIII. De meeste vangsten stammen uit juni en juli. De tweede generatie is hoogstaarschijnlijk partieel.

Vindplaatsen. Fr.: Vlieland (CAMPING). Dr.: Peize, Roden, Donderen, Norg, Assen, Geuzingerveld (Ruinen), Uffelte, Vledder. Ov.: Lutterzand, Breklenkamp, Dene-kamp, Almelo, Nijverdal, Boetelerveld, Zandbelt (Diepenveen), Steenwijk. Flevoland: Lelystad (1962, VAN DE POL). Gdl.: Ermelo, Elspeet, Hulshorst, Vierhouten, Velp, Hoenderlo, Kootwijk, Wageningen, Bennekom; Almen, Vorden, Meddo. Utr.: Maarn. N.H.: Bussum, Overveen (1942, HELMERS). Z.H.: Wassenaarse Slag (1942, Zoöl. Mus.). N.B.: Hilvarenbeek, Hooge Mierde, Kampina, Esch, Eindhoven, Nuenen, Gerwen, Lierop, Asten, Helene-veen, De Rips. Lbg.: Meijel, Sevenum, Lomm, Swalmen, Melick, Heerlen, Epen.

Variabiliteit. De nominaatvorm vliegt in de Vendée. De bontere sub-species van het noordwesten van Europa, waartoe dus ook onze populaties behoren, werd door HOFFMEYER onderscheiden als subsp. *septentrionalis*. Deze naam is echter gepreoccupeerd. BOURSIN gaf als nieuwe naam subsp. *warneckeai* (1963, *Linn. Belg.* 2 : 125, noot 3; 1964, *Bull. mens. Soc. Linn. Lyon* 33 : 240).

Chloridea peltigera Schiff. *Tijdschr. Entom.* 84 : 335; *Cat. VI* : (383). In de loop van de jaren is de vlinder in alle provincies behalve Utrecht aangetroffen, maar hij blijft een zeldzaamheid, die lang niet elk jaar in Nederland wordt waargenomen. Het hoogste aantal exemplaren werd tot nog toe in 1958 geteld, namelijk 11 stuks.

Wat de vliegtijd betreft, is *peltigera* in alle maanden van mei tot in de tweede helft van september gevangen. Alle exemplaren van mei, juni en zeker nog van begin juli zijn immigranten, die van de tweede helft van juli en later afstammelingen daarvan. Maar of de laatste zich steeds hier te lande ontwikkeld hebben, blijft de vraag. De beste maand is augustus. Uit september zijn slechts vijf vangsten bekend en uit oktober geen enkele.

Vindplaatsen. Fr.: Vlieland, 10.VII.1952 (CAMPING). Gr.: Groningen, 9.V.1958 (WILMINCK). Dr.: Havelte, 19.VIII.1955 (VAN DER MEULEN). Ov.: Raalte, 12.VIII.1958 (FLINT); Abdij Sion, 17.V.1964 (Pater AMADEUS). Flevoland: Lelystad, 18.VI.1962 (VAN DE POL). Gdl.: Apeldoorn, 7.VII.1952 (LEFFEF, in Zoöl. Mus.), 23.V.1958 (LEFFEF); Lunteren, 14.VIII.1945, e. l. (BRANGER); Zeddam, 16.VIII.1946 (SCHOLTEN). N.H.: Amsterdam, 2.VIII.1945 (BOTZEN); Hembrug, 20.IX.1947 (ANDERSEN); Beemster, 15.V.1958 (HUISENKA); Hoorn, 20.VIII.1958 (Zoöl. Mus.); Wieringermeer, 31.VIII.1958 (DE VRIES). Z.H.: Rijnsburg, twee rupsen op goudsbloem, waarvan één 26.VII.1945 de vlinder leverde (WITPEN); Schiedam, vier exemplaren in juli 1945 (NIJSSEN); Rotterdam, 10.V.1958 (ELFFERICH); Oostvoorne, 22.VIII.1959 (LUCAS); Melissant, 29.VIII., 1.IX en 6.IX.1958 (HUISMAN); Ouddorp, 20.VIII.1965 (VROEGINDEWEIJ). Zl.: Burgh, 11.VIII.1964 (BOOT); Haamstede, 29.V.1965 (VAN RANDEN); Westenschouwen, 10.VIII.1962 (WILMINCK). N.B.: Bergen op Zoom, 5.VIII en 7.VIII.1945 (NIJSSEN); Eindhoven, 17.VI.1964 (VAN DER WOLF). Lbg.: Bunde, 27.VIII.1964 (LEFFEF).

Variabiliteit. De vlinder is zeer variabel, zowel wat de grondkleur van de voorvleugels als wat de sterkte van de tekening betreft. In een voortreffelijk artikel heeft KETTLEWELL aangetoond, dat beide in elk geval voor een groot deel afhangen van de temperatuur van de actieve fase van de pop, dat wil zeggen van de fase gedurende welke de afgebroken weefsels van de rups omgezet worden in die van de vlinder. En daar de temperatuur weer de lengte van deze fase beïnvloedt, hangen kleur en tekening dus af van de duur van de actieve fase. Daaren-

tegen heeft de temperatuur gedurende de passieve fase (dat is de fase van de afbraak, de tijd onmiddellijk na de verpopping) niet de minste invloed. Zie *Proc. Trans. South London ent. nat. Hist. Soc.* 1943—1944 : 69—79, pl. I, 1944. Het op plaat 4 fig. 11 afgebeelde exemplaar heeft zeer lichte voor- en achtervleugels en komt overeen met KETTLEWELL's experiment 4. De poppen hiervan werden gedurende de actieve fase aan een hoge temperatuur blootgesteld (37° C.), zodat ze zich snel ontwikkelden. Dit zou er op kunnen wijzen, dat zulke lichte exemplaren immigranten uit tropisch Afrika zijn. Een dergelijk licht exemplaar is ook dat van Eindhoven (1964), terwijl een groot deel van de andere hier gevangen dieren min of meer er mee overeenstemmen.

f. *condolens* Schawerda, 1914, *Verb. zool.-bot. Ges. Wien* 64 : 365. De zwarte band langs de achterrand van de achtervleugels is sterk verbreed en mist de lichte vlek bij de binnenrandshoek. Plaat 4 fig. 12. Bunde, 1964 (LEFFEF).

(Het exemplaar lijkt het meest op de nummers 4 en 5 van KETTLEWELL's experiment 7, dat betrekking had op poppen, die niet konden overwinteren, maar zich onmiddellijk moesten ontwikkelen. De achtervleugels zijn echter donkerder).

f. *obscura* nov. Grondkleur van voor- en achtervleugels witachtig met iets crème tint, maar de voorvleugels sterk verdonkerd door de zware donker bruingrijze tekening: het gehele wortelveld is donker, een brede donkere band loopt basaalwaarts van de golflijn en de rest van de voorvleugels is min of meer donker bestoven. De vorm lijkt het meest op KETTLEWELL's exemplaren van experiment 5, maar de grondkleur is witter. Plaat 4 fig. 13. Hoorn, ♂, 20.VIII.1958 (holotype, Zoöl. Mus.).

[Ground colour of the fore wings whitish with slight creamy tint, but the fore wings strongly darkened by the heavy dark brown-grey markings: the whole basal area is dark, a broad band basad of the submarginal, and the remainder of the fore wings more or less covered by dark scales.]

Chloridea armigera Hübner. *Tijdschr. Entom.* 84 : 335; Cat. VI : (383). Terwijl van deze soort in 1941 negen vangsten in ons land bekend waren en van de vorige soort slechts drie, zijn sinds dat jaar van *armigera* veel minder nieuwe waarnemingen bekend geworden dan van *peltigera*, zoals duidelijk uit het volgende lijstje van nieuwe vondsten blijkt. Van 1941 tot en met 1965 is *armigera* slechts in vier jaren waargenomen met als hoogste totaal drie stuks in 1950. De vlinder behoort dan ook tot onze zeer zeldzame trekvlinders.

Voorjaarsimmigranten zijn tot nu toe nog nooit bij ons gezien. Alle exemplaren zijn laat in de zomer of in de herfst gevangen, namelijk tussen 9 augustus en 11 oktober. Evenmin zijn hier ooit rupsen gevonden.

Vindplaatsen. Dr.: Grollo, 18.IX.1962 (LEFFEF). Utr.: Soest, 24.VIII.1944, een vrij gaaf ♀ overdag honing zuigend op dophei (LEMPKE, nu in Zoöl. Mus.). N.H.: Aerdenhout, 20.VIII.1950 (VAN WISSELINGH). Z.H.: Leiden, 20.IX.1956 (KROON). Zl.: Burgh, 3.IX.1962 (PEERDEMAN), 11.X.1962 (LEFFEF). Lbg.: Swalmen, 4.X.1950 (LÜCKER); Stein, 4.X.1961 (Missiehuis); Brunssum, 7.X.1950 (DIEDEREN).

Variabiliteit. Het is niet onmogelijk, dat *armigera* op ongeveer dezelfde wijze op de temperatuur reageert tijdens het gevoelige stadium van de pop als *peltigera*. Proeven zijn met deze soort echter tot nog toe niet genomen.

f. fusca Cockerell, 1889, *Entomologist* 22 : 4. De auteur verwijst alleen naar *Entomologist* 11 : 24, waar staat: „a dark brown variety”. Zo een donker exemplaar wordt door WARREN afgebeeld in „Seitz” 3, pl. 50 rij k fig. 7. Een vrij extreem exemplaar van de vorm is dat van Brunssum. De voorvleugels zijn nog slechts rondom de discale vlek licht geelbruin, overigens zwartbruin, de achtervleugels hebben een brede donkere achterrond en ook de wortelhelft is donkerder getint.

Chloridea scutosa Schiff. *Tijdschr. Entom.* 84 : 334; Cat. VI : (382). Tot 1941 was slechts één Nederlands exemplaar bekend, dat in 1878 te Wolfheze gevangen was. Daarbij komen negen nieuwe waarnemingen, meer dus dan van de vorige soort. Toch is ook *scutosa* bij ons een zeldzaamheid. Slechts in één enkel jaar werden twee stuks gevangen, in de weinige andere jaren dat de vlinder hier gezien werd, telkens slechts één.

In Denemarken werd *scutosa* voor het eerst in 1942 aangetroffen, maar toen meteen al in niet minder dan een dozijn exemplaren. En in de daarop volgende jaren vermeldt HOFFMEYER in de tweede druk van zijn „Danske Ugler” (1962, p. 305) tal van vangsten. Ook Finland kende zeer goede *scutosa*-jaren (1953 en 1960) en in Noorwegen werd de soort in 1953 eveneens in aantal gevangen. Het lijkt er daarom op, dat de vlinder over het algemeen een meer oostelijk gelegen trekbaan heeft, want in 1953 werd in Nederland slechts één exemplaar gevangen en in 1960 zelfs geen enkel. Hierop wijst ook het feit, dat in 1953 in Groot-Brittannië geen enkel exemplaar aangetroffen werd en in 1960 slechts één. Volgens een mededeling van wijlen Dr. WARNECKE was *scutosa* in 1942 talrijk in Noord-Duitsland en werden veel rupsen gevonden. Verschillende berichten hierover zijn te vinden in *Ent. Z. Frankfurt* 56 (1942 en 1943), terwijl URBAHN in hetzelfde tijdschrift (57 : 9—14, 1943) een uitvoerig artikel over dit voorkomen publiceerde met een kaart. In 1954 werd nog een exemplaar in de omgeving van Hamburg gevangen. Overigens zijn mij geen nieuwe gegevens over het omringende gebied bekend.

Wat de vliegtijd betreft, zijn de vangsten hier te lande verdeeld over de maanden juni tot en met september met een (overigens zeer laag) maximum in augustus.

Vindplaatsen. Gdl.: Didam, ♂, 12.VIII.1942 (SCHOLTEN). Utr.: Rhenen, een rups in 1943, die mislukte (DOETS); Soest, 14.VIII.1945, een vrij goed ♂ overdag zuigend op dophei (LEMPKE, in Zoöl. Mus.); Groenekan, 2.IX.1942, een exemplaar zuigend op bloeiende hei (BERK). N.H.: Blaricum, 26.VIII.1956 (BERGMAN). Z.H.: Leiden, 12.VI.1953 (KROON). N.B.: Geldrop, 5.IX.1958 (HAANSTRA). Lbg.: Sittard, 18.VIII.1947 en 10.VII.1948 (DIEDEREN); Simpelveld, VIII.1954 (VAN DE POL); Rijckholt, 10.VIII.1954 (idem).

Pyrrhia Hübner

Pyrrhia umbra Hufnagel. *Tijdschr. Entom.* 84 : 341; Cat. VI : (389). Uit de beide gecombineerde lijsten van vindplaatsen blijkt duidelijk, dat de vlinder over vrijwel het gehele land verbreid is zonder duidelijke voorkeur voor een bepaald biotoop. Hij is zowel op de zandgronden aangetroffen als in het Hafdistrict en het Fluviaal District. Het menu van de rups is ook zeker niet zo beperkt als in verschillende boeken staat. Behalve de door iedere auteur vermelde *Ononis* (stal-

kruid) werd in Cat. VI al wilg genoemd, terwijl LEFFEF de rups bij Wiessel op wilgenroosje aantrof. SEPP schrijft (7 : 37), dat VAN MEDENBACH DE ROOY hem een rups stuurde, die hij volwassen op *Pelargonium* had gevonden. Of het dier ook op deze plant opgegroeid was, is echter niet zeker. Te kweken is de rups heel makkelijk met varkensgras, ook uit het ei, maar het staat al weer niet vast, of hij ook in de vrije natuur op *Polygonum* voorkomt. In elk geval verklaart het blijkbaar vrij gevarieerde menu het voorkomen van de soort in diverse biotopen. *P. umbra* is nu bekend van twee van de waddeneilanden.

De vliegtijd kan al in de tweede helft van mei beginnen (25.V.1960, LUCAS; 27.V.1960, BOGAARD) en voortduren tot in de tweede helft van augustus (14.VIII.1950, Neercanne, Leids Mus.; 17.VIII.1942, Almelo, KNOOP; 19.VIII.1959, Oostvoorne, LUCAS). Opvallend laat is een zeer vers exemplaar van 17.IX.1931 (VAN WISSELINGH). Dit behoort ongetwijfeld tot een wel zelden voorkomende en zeer partiële tweede generatie.

Vindplaatsen. Fr.: Terschelling (vrij gewoon, LEFFEF), Vlieland, Leeuwarden, Tietjerk, Eernewoude, Wijnjeterp (bij de Rivon-inventarisatie in 1965 gewoon, G. DIJKSTRA), Oosterwolde, Nijetrijne, Oudemirdum, Rijs. Gr.: Veendam, Vlagtwedde, Ter Borgh. Dr.: Roderwolde, Roden, Peize, Norg, Westervelde, Veenhuizen, Eext, Grollo, Odoorn, Dwingelo, Vledder, Havelte. Ov.: Volthe, Denekamp, Albergen, Almelo, Aadorp, Nijverdal, Raalte, Abdij Sion, Bathmen, Colmschate, Deventer, Balkbrug, Kalenberg, Marknesse, Flevoland: Lelystad. Gdl.: Elspeet, Vierhouten, Epe, Heerde, Wiessel, Hoog-Soeren, Assel, Uchelen, Teuge, Empe, Hall, Loenen, Laag-Soeren, Hoenderlo, Kootwijk, Wageningen, Bennekom, Ede, Lunteren; Epse, de Voorst, Zutphen, Ruurlo, Winterswijk, Ratum, Aalten, Hoog-Keppel, Didam, Babberich, Aerdt; Heteren, Slijk-Ewijk, Buren, Tiel. Utr.: Austerlitz, Zeist, Maarsen, Botshol. N.H.: 's-Graveland, Hilversum, Blaricum, Huizen, Bussum, Kortenhoef, Weesp, Amsterdamse Bos (weinig, PEERDEMAN), Halfweg, Zaandam, Wormerveer, Beemster, Oosthuizen, Hoorn, Schoorl, Egmond aan Zee, Heemskerk, Bloemendaal, Aerdenhout. Z.H.: Woerdense Verlaat, Noordwijk, Oegstgeest, Staelduin, Vlaardingen, Capelle aan den IJssel, Krimpen aan den IJssel, Arkel, Schelluinen, Hendrik-Ido-Ambacht (geregeld, in 1966 gewoon), Rhoon, Oostvoorne, Rockanje, Hellevoetsluis, Melissant, Goedereede, Ouddorp. Zl.: Burgh, Haamstede, Westenschouwen, Oostkapelle, Valkenisse. N.B.: Udenhout, Waalwijk, Sint Michielsgestel, Uden, Velp (bij Grave), Best, Eindhoven, Nuenen, Helmond, Someren, Maarheeze, Helenaveen. Lbg.: Griendsveld, Sevenum, de Hamert, Steijl, Belfeld, Swalmen, Weert, Moesel, Heel, Sint Odiliënberg, Montfort, Stein, Brunssum, Heerlerbaan, Chèvremont, Geulem, Bemelen, Bunde, Neercanne, Sint Pietersberg, Gronsveld, Epen, Vijlen.

Variabiliteit. f. *marginata* Fabricius, 1787. Exemplaren met gele grondkleur van de voorvleugels zijn niet zeldzaam, maar schijnen vooral bij de mannetjes voor te komen. Soms is de kleur bleekgeel en wordt de tint van de achterrandsband van de voorvleugels bleekpaars, terwijl dan ook de donkere band op de achtervleugels lichter van kleur wordt.

f. *suffusa* Lempke, 1941. Exemplaren met roodbruin bestoven en daardoor donkerder dan normale voorvleugels werden nog bekend van: Frederiksoord, Ruurlo, Amsterdam, Best (Zool. Mus.); Wolvega, Aerdenhout, Welterberg, Epen (VAN WISSELINGH).

f. *depurpura* nov. De rode band langs de achterrandsband van de voorvleugels zonder paarse tint. Wiessel, ♂, 31.VII.1954 (holotype, VAN DE POL); Amsterdam (PEERDEMAN); Beemster (HUISENKA); Chèvremont (LUKKIEN).

[The red band along the outer border of the fore wings without purple tint.]

f. *postclara* nov. Achtervleugels eenkleurig geelachtig wit met scherp afstekende zwarte band langs de achterrond. De donkere bestuiving aan de wortel ontbreekt dus geheel. Plaat 5 fig. 1. Valkenisse, ♂, 7.VII.1963 (holotype), Oostkapelle, ♂, 1962 (VAN AARTSEN, in Zoöl. Mus.).

[Hind wings unicolorous yellowish white with sharply contrasting black band along the outer margin. The dark suffusion of the base fails completely.]

f. *postfasciata* nov. Achtervleugels eenkleurig zwart op een scherp afstekende lichte submarginale band na. Rotterdam (Kralingerhout), 21.VII.1961 (holotype, (VAN DER AA).

[Hind wings unicolorous black with the exception of a sharply contrasting pale submarginal band.]

f. *juncta* nov. De ronde vlek en de niervlek raken elkaar. Frederiksoord, ♂, 1.VII.1930 (holotype, Zoöl. Mus.).

[Orbicular and reniform touch each other.]

Dwergen. Lelystad, Bennekom, Slijk-Ewijk (VAN DE POL); Zaandam (AUKE-MA); Oosthuizen (DE BOER); Dordrecht (kapelaan GROENENDIJK).

Panemeria Hübner

Panemeria tenebrata Scopoli. *Tijdschr. Entom.* 84: 342; Cat. VI: (390). De vlinder blijkt een zeer grote verspreiding in ons land te hebben en zeker niet beperkt te zijn tot de zandgronden. Ook in het Hafdistrict en het Fluviaal District is hij op verschillende plaatsen aangetroffen zonder dat steeds aan een verspreiding via de spoorbanen gedacht kan worden. Tevens is hij nu van een van de waddeneilanden vermeld.

Hoewel *tenebrata* plaatselijk heel gewoon kan zijn, is het verschillende verzamelaars opgevallen, dat het dier op plaatsen, waar het voorheen geregeerd voorkwam, later niet meer te vinden is. Zo schreef wijlen KNOOP me, dat hij de vlinder na 1950 niet meer in Twente gezien had. En BOGAARD merkte op, dat de omgeving van Ottoland van 1958—1961 een zeer goede vliegplaats was (op 5 mei 1960 werden 25 stuks in een half uur gevangen), maar dat daarna geen enkele vlinder meer werd waargenomen. Dit kan mogelijk in verband staan met veranderingen in de flora van het betreffende gebied. Overigens is de rups zeker niet aan één enkele *Cerastium*-soort gebonden. In het Zoöl. Mus. bevindt zich een lange serie, die door DOETS gekweekt werd uit rupsen, die hij bij Kortenhoef op *Cerastium triviale* (Hoornbloem) vond, terwijl Boot in zijn tuin te Haamstede de rupsen op de gekweekte *Cerastium* aantrof (*C. tomentosum* of *C. biebersteinii*).

LEFFEF schreef me de volgende interessante opmerking: „De vlinders zijn moeilijk te zien. Ze vliegen razend snel in de zon, de mannetjes tot ongeveer 14 uur. De wijfjes vliegen echter door. Zodra de zon weg is, bv. door bewolking, is geen beest te zien. Ik heb de moeite genomen eens af te wachten, waar zo'n dier zich dan ging verschuilen. Dat is mij één keer gelukt. Het bleek, dat zodra een wolk voor de zon kwam, de vlinder gewoon onder de bloem kroop en daar met het kopje omlaag tegen de steel vlak onder de kelkverdikking ging zitten. Natuurlijk volkomen onzichtbaar voor al wie boven op de bloem kijkt.”

De vliegtijd kan tot begin juli duren. De uiterste data worden nu: 27.IV—5.VII.

Vindplaatsen. Fr.: Terschelling (langs polderwegen, LEFFEF), Wolvega (in mei 1956 talrijk, G. DIJKSTRA), Rijss. Dr.: Peizermade, Peize, Paterswolde, Norg, Veenhuizen, Vries, Eext, Gasteren. Ov.: Volthe, Albergen, Agelo, Weerselo, Almelo, Aadorp, Elzen, Bathmen, Colmschate, IJsselmuiden, Dalfsen, Steenwijkerwold, Vollenhove. Gdl.: Hoog-Soeren, Teuge, Heelsum, Bennekom; Warnsveld, Eefde, Lochem, Hoog-Keppel, Babberich, Tolkamer, Aerdt. Utr.: Grebbe, Amerongen, Maarn, Zeist, Amersfoort, Soesterberg, Hollandse Rading. N.H.: Kortenhoef, Amstelveen, Aalsmeer, Cruquius (Haarlemmermeer), Hembrug, Zaandam, Assendelft, Overveen, Heemstede. Z.H.: Voorburg, Nootdorp, Staelduin, Capelle aan den IJssel, Krimpen aan den IJssel, Lekkerkerk, Ottoland, Schelluinen, Rozenburg, Melissant, Ouddorp. Zl.: Burgh. N.B.: Bergen op Zoom, Ulvenhout, Hilvarenbeek, Kampina, Boxtel, Best, Nederwetten, Nuenen, Valkenswaard, Veghel, Uden, Velp (bij Grave). Lbg.: Sevenum, Tegelen, Blerick, Heel, Herkenbosch, Stein, Schinveld, Wijnandsrade, Wijlre, Maastricht, Sint Pietersberg, Vijlen.

Variabiliteit. f. *tenuivittata* nov. Bovenzijde achtervleugels met opvallend smalle gele band. Chèvremont, ♀, 15.V.1956 (holotype, LUKKIE).

[Upper side hind wings: yellow band distinctly narrowed.]

f. *pallida* nov. Grondkleur van de voorvleugels bleekbruin. Nederwetten, ♀, 2.VI.1965 (holotype, VAN DER WOLF).

[Ground colour of the fore wings pale brown.]

f. *nigrescens* nov. Grondkleur van de voorvleugels zwartachtig met nauwelijks zichtbare tekening. Nederwetten, ♀, 14.V.1966 (holotype, VAN DER WOLF).

[Ground colour of the fore wings blackish with hardly visible markings.]

Dwerg. Vaals (VAN WISSELINGH).

Periphanes Hübner

Periphanes delphinii L. *Tijdschr. Entom.* 84 : 340; *Cat. VI* : (388). Geen enkel nieuw gegeven is over deze fraaie soort bekend geworden. Hij is in onze omgeving stellig sinds lang uitgestorven.

Axylia Hübner

Axylia putris L. *Tijdschr. Entom.* 82 : 236; *Cat. IV* : (243). Uit de hierbij afgedrukte verspreidingskaart (fig. 44) blijkt, dat de soort in allerlei biotopen is aan te treffen en moeilijk een typische bewoner van zandgronden genoemd kan worden. Ook in het Hafdistrict en het Fluviatiel District is hij thuis en kan daar op zeer vochtige plaatsen voorkomen (Naardermeer, Nieuwkoopse plassen enz.). Op verschillende plaatsen in het lage land is *putris* gewoon (Tjerkwerd, Halfweg, Beemster, Hoorn, Hendrik-Ido-Ambacht). In 1963 was de vlinder op laatstgenoemde plaats zelfs zeer talrijk. Op 2.VII trof BOGAARD in zijn vangapparaat 480 stuks aan, op 5.VII niet minder dan 714! Ook bij het Rivon-onderzoek te Aerdt (1965) bleek *putris* gewoon te zijn, terwijl hij in 1964 bij honderden uit de Rivon-val te Roggel te voorschijn kwam (PEERDEMAN). LEFFEF vat zijn veel-

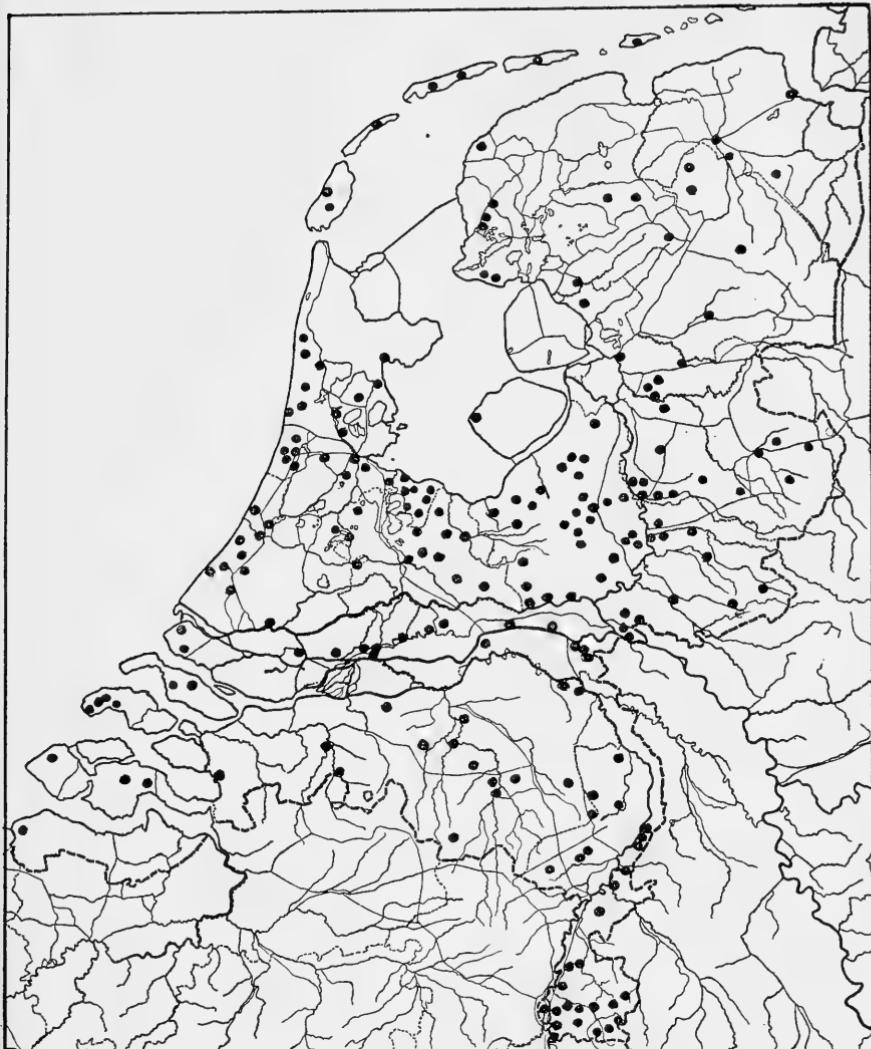


Fig. 44. Verbreiding van *Axylia putris* L. in Nederland.

jarige ervaring aldus samen: vrijwel overal opgemerkt, maar vooral in cultuurgebieden in zeer bescheiden aantallen, vergeleken met bijv. *Amathes c-nigrum* en *Ochropleura plecta*. Overigens sterk afwisselend in de mate van voorkomen, al naar de seizoenen.

Met uitzondering van Rottum is *putris* nu van alle waddeneilanden bekend.

De eerste generatie kan al in de eerste decade van mei beginnen te vliegen. De grenzen ervan worden nu: 5.V (1961, Stein, Missiehuis) tot 1.VIII. Die van de (partiële) tweede worden: 5.VIII tot 14.IX. In zeer gunstige jaren komt echter zelfs een (heel kleine) derde generatie voor. Met zekerheid is deze waargenomen

in 1953, 1959, 1961, 1963 en 1964, van eind september tot half oktober (vers exemplaren!). De uiterste data ervan zijn: 26.IX—16.X.

V a r i a b i l i t e i t. De vlinder is variabeler dan oppervlakkig lijkt. Vooral de tint van de voorvleugels en de uitgebreidheid van de donkere kleur erop schommelen nogal. Maar ook in de tekening komen soms interessante afwijkingen voor.

f. lignosa Hübner, [1800—1803]. Exemplaren met donkerder grondkleur van de voorvleugels, meer geelachtig oker, komen vrij verbreid onder de soort voor.

f. ruficosta nov. Voorrond van de voorvleugels donker roodbruin. Weesp, Haarlem, ♂, 19.V.1962 (holotype, beide in Zoöl. Mus.).

[Costa of the fore wings dark red-brown.]

f. obscura nov. De donkere tekening langs de costa zo verbreed, dat ronde vlek en niervlek erin vallen. Bovendien is de kleur ervan verdonkerd tot zwartbruin. Plaat 5 fig. 2. Apeldoorn, Halfweg, ♂, 22.VI.1961 (holotype, beide in Zoöl. Mus.); Lelystad, Wageningen, Slijk-Ewijk (VAN DE POL).

[The dark markings along the costa of the fore wings broadened, so that they reach beyond the orbicular and the reniform. Moreover, their colour is black-brown.]

f. clara nov. Voorvleugels zeer licht, costa slechts iets of in het geheel niet verdonkerd, tekening langs de achterrond bijna verdwenen, alleen ronde vlek en niervlek duidelijk afstekend; achtervleugels eenkleurig geelachtig wit. Plaat 5 fig. 3. Zeist (GORTER); Utrecht (Leids Mus.); Hilversum, Laren, Amsterdam (♀, 14.VII.1907, holotype) (Zoöl. Mus.); Hendrik-Ido-Ambacht (BOGAARD); Melissant (HUISMAN); Nuenen (NEIJTS); Tegelen (OTTENHEIJM); Heer (VAN DE POL). Blijkbaar geen zeldzame vorm.

[Fore wings very pale, costa only a little or not at all darkened, markings along the outer border nearly absent, only orbicular and reniform distinctly contrasting; hind wings unicolorous yellowish-white.]

f. unimacula nov. De ronde vlek ontbreekt. Oosterbeek, ♀, 20.VI.1908 (holotype), Hilversum, Amsterdam (Zoöl. Mus.); Warnsveld, Rotterdam (Leids Mus.).

[The orbicular is absent.]

f. bilineata nov. Voorvleugels met volledige eerste en tweede dwarslijn. Maastricht, ♂, 17.VI.1939 (holotype, KORTEBOS).

[Fore wings with complete antemedian and postmedian.]

f. tangens nov. Als de vorige vorm, maar de beide dwarslijnen raken elkaar even boven de binnenrand en lopen dan weer uit elkaar. Oostvoorne, 16.VII.1961 (holotype, LUCAS).

[As the preceding form, but the two transverse lines meet each other a little above the inner margin and then separate again.]

Dwergen. Nuenen (VERHAAK).

QUADRIFINAE

De onderfamilies behorende tot de quadrifine uilen (met vier analaderen in de achtervleugels) zijn grotendeels gerangschikt volgens het systeem van Dr. Ch.

DUFAY, de Franse specialist van deze groep, met enkele correcties op de door hem gebruikte nomenclatuur.

JASPIDIINAE

Porphyrinia Hübner

Porphyrinia parva Hübner. Immigrant uit Zuid-Europa, die voor het eerst in een paar exemplaren in 1964 in ons land is aangetroffen. Uit Denemarken en het omringende Duitse gebied zijn mij geen vangsten bekend. In België werd de vlinder op 7 juni 1958 te Wavreille bij Han-sur-Lesse aangetroffen (*Lambillionea* 59 : 55, 1959). In Engeland is *parva* herhaaldelijk vooral in de graafschappen langs de zuidkust gesignaleerd. In mei en juni 1953 was het dier er zelfs talrijk („SOUTH”, nieuwe editie 1 : 348, 1961). In 1947 werden twee exemplaren in Ierland gevangen.

Van de vliegtijd hier te lande is uiteraard nog niet veel bekend. Twee exemplaren werden in juni gevangen, het derde in augustus.

Vindplaatsen. Z.H.: Melissant, 13.VI.1964 (HUISMAN, afgebeeld in *Ent. Ber.* 25 : 153). Lbg.: Roggel, 6.VI.1964 (PEERDEMAN); Cadier, 28.VIII.1964 (VAN AARTSEN, nu afgebeeld plaat 5 fig. 4).

Porphyrinia ostrina Hübner. Deze soort, eveneens een immigrant, is tot nu toe slechts éénmaal in ons land aangetroffen, namelijk in 1958. Ook hiervan zijn geen waarnemingen uit Denemarken en het omringende Duitse gebied gemeld, maar evenmin uit België. Wel is *ostrina* weer bekend van het zuiden van Engeland, maar is er toch veel minder waargenomen dan *parva*. Uit Ierland is slechts één vangst bekend van 1947. Zie overigens „SOUTH”, l. c.: 347.

In *Ent. Ber.* 19 : 135—137 (1959) heeft KUCHLEIN na zijn vangst een artikel over de soort gepubliceerd met foto van het exemplaar en kaart van de vindplaatsen in West-Europa.

Vindplaats. N.H.: Overveen, 24.V.1958, ♂ (KUCHLEIN).

Jaspidea Hübner

Jaspidea pygarga Hufnagel. *Tijdschr. Entom.* 90 : 89; *Cat. VIII* : (499). Het voornaamste biotoop wordt in ons land ongetwijfeld gevormd door bosachtige gebieden en deze worden het meest aangetroffen op de zandgronden en in het Krijtdistrict. Toch zijn nu opvallend veel vindplaatsen in het Hafdistrict en het Fluviaal District bekend geworden, hoewel het bijna steeds vangsten van enkele lingen betreft. Het merendeel zal dan ook wel betrekking hebben op zwervers. Zulke vindplaatsen zijn: Sexbierum (1963, STOBBE), Zwartsluis (HARSEVOORD), Weesp (Zoöl. Mus.), Amsterdamse Bos (weinig, PEERDEMAN), Nek (N.H., 1964, WIEDIJK), Hoorn (HOUTMAN), Slijk-Ewijk (5.VI en 19.VI.1961, VAN DE POL), Buren (1962, idem), Heteren (1961, HUISMAN), Geldermalsen (1962, Tuinbouwschool), Leiden (hier gewoon, LUCAS), Arkel (1963, ZWAKHALS), Schelluinen (1955, SLOB), Hendrik-Ido-Ambacht (vrij gewoon, BOGAARD), Melissant (1961,

HUISMAN). Vermeldenswaard is verder Cadzand (PEERDEMAN). De vlinder is nu ook bekend van Terschelling.

De vliegtijd kan al in de eerste decade van mei beginnen. De uiterste data van de hoofdgeneratie worden nu: 9.V—14.VIII. De vroegste datum werd in 1959 door LUCAS te Oostvoorne waargenomen. Het is nu wel zeker, dat in gunstige seizoenen nog een zeer kleine partiële tweede generatie kan voorkomen. Deze is bekend uit de jaren 1925, 1943, 1946, 1950, 1953, 1957 en 1963. Behalve de reeds in Cat. VIII vermelde vangsten kennen we nu de volgende: 10.IX.1943, Wassenaar (VAN WISSELINGH), 7.X.1950, Twello (COLDEWEIJ), 9.X.1953, Aerdenhout (VAN WISSELINGH), 7.IX.1957, Epen (idem), 28.IX.1957, Gassel (VAN DE POL), 22.IX.1963, Helenaveen (LEFFEF). De uiterste data ervan zijn dus: 7.IX—9.X.

Variabiliteit. f. *albilinea* Haworth, 1809. Deze verdonkerde vorm komt vrijwel overal onder de soort voor. Er zijn zoveel nieuwe vindplaatsen, dat het geen zin heeft ze alle op te sommen.

f. *nigra* nov. Voorvleugels eenkleurig zwart, de dwarslijnen en de omtrekken van de vlekken nog net zichtbaar; achtervleugels donkergris. Tegelen, ♂, 4.VI. 1961 (holotype, OTTENHEIJM).

[Fore wings unicolorous black, the transverse lines and the circumscriptions of the stigmata hardly visible; hind wings dark grey.]

f. *brunnescens* Lempke, 1949. Nieuwe vindplaats: Roermond (LÜCKER).

f. *albomarginata* Spuler, 1907. Van de vorm met brede witte band op de voorvleugels franjewaarts van de tweede dwarslijn, doorlopend van voorrand tot binnenrand, zijn enkele nieuwe vindplaatsen bekend geworden: Bilthoven, Vijlen (Zoöl. Mus.); Epen (VAN WISSELINGH).

f. *ochrea* Derenne, 1928. Exemplaren, waarbij de voorvleugels een geelachtige in plaats van een witte vlek hebben, komen wat meer voor. Nieuwe vindplaatsen: Eext (WITMOND); Abdij Sion (FLINT); Wageningen, Gassel (VAN DE POL); Babberich (ELFRINK); Aalten (VAN GALEN); Scheveningen (KALLENBACH); Oostkapelle, Best, Vijlen (VAN AARTSEN, in Zoöl. Mus.); Eindhoven (NEIJTS); Heeze (VAN WISSELINGH).

Dwerg. Apeldoorn (LEFFEF).

Jaspidia deceptoria Schiff. *Tijdschr. Entom.* 90 : 89; Cat. VIII : (499). De vlinder is er zonder twijfel in geslaagd de laatste 15 jaar vaste voet in ons land te krijgen. Hij is al verscheidene jaren plaatselijk zeer gewoon in het zuiden van Limburg, maar werd ook aangetroffen op verschillende plaatsen in het oosten van het land.

Ook in Denemarken is *deceptoria* sinds 1950 minder zeldzaam geworden en is nu op enkele plaatsen zelfs gewoon (HOFFMEYER, De Danske Ugler, 2de druk : 314, 1962). Nieuwe vindplaatsen voor Sleeswijk-Holstein en de omgeving van Lübeck worden vermeld in *Mitt. faun. Arb.gemeinsch. Schleswig-Holstein* etc., N. F. 4 : 51 (1951), 6 : 57 (1953), 7 : 12 en 40 (1954). Voor België wordt alleen een vangst te Romont gemeld (*Lambilionea* 55 : 11, 1955). Na de eerste vangst in 1948 werden in het zuiden van Engeland enkele exemplaren gevangen,

in 1952 en 1954 in Kent (cf. *Ent. Rec.* 78: (316), 1966), 1952 (in het noord-oosten van Sussex, *Ent. Rec.* 64: 262) en in 1956 (in het oosten van Sussex, *Ent. Gaz.* 8: 29, 1957). Hier lijkt de vlinder dus een immigrant gebleven te zijn.

De vliegtijd kan al in de laatste decade van april beginnen en voortduren tot de laatste decade van juli. De uiterste data zijn nu: 24.IV—25.VII. De vroegste vangst stamt uit 1959 (Cadier, NIES), de late uit 1962 (Montfort, MAASEN).

Vindplaatsen. Fr.: Wijnjeterp (1965, G. DIJKSTRA). Dr.: Grollo (1960, LEFFEF). Ov.: Ommen (1964, VAN WISSELINGH); Abdij Sion (1964, Pater AMADEUS). Gdl.: Wageningen (1954, VAN DE POL); Vorden (1939, HARDONK). Lbg.: Sevenum (1954, VAN DE POL); Swalmen (1957 en volgende jaren, PIJPERS, LÜCKER); Vlodrop (1959, LÜCKER); Meijweg (1966, MAASEN); Montfort (1962, dezelfde); Brunssum (CLAASSENS, DIEDEREN); Simpelveld (1954, VAN DE POL); Kunrade (LEFFEF); Wijlre (idem); Eijs (1957, VAN DE POL); Gerendal (LEFFEF); Bemelen (idem); Cadier en Keer (vele verzamelaars); Vijlen (1962, LEFFEF); Vaals (1953, LÜCKER).

Variabiliteit. De vlinder varieert heel weinig.

f. latefasciata nov. Bovenzijde voorvleugels: de witte gewaterde band duidelijk verbreed. Plaat 5 fig. 6. Simpelveld, ♂, VI.1954 (holotype, VAN DE POL).

[Upper side fore wings: the white submarginal band distinctly widened.]

Eustrotia Hübner

Eustrotia bankiana Fabricius, 1775 (*olivana* Schiff., 1775; zie voor de prioriteit van de in 1775 gepubliceerde werken supplement VII: (449)). *Tijdschr. Entom.* 90: 91; *Cat. VIII*: (501). Er kan weinig twijfel aan bestaan, dat het oorspronkelijke Nederlandse biotoop werd gevormd door moerassige gronden, zoals dan ook in *Cat. VIII* werd geschreven, en nog altijd zijn zulke terreinen de aangewezen plaatsen om naar de gemakkelijk op te jagen vlinder uit te kijken. Ook op de Britse eilanden (waar hij in Engeland zelf zeer sterk achteruit gegaan is, zie „SOUTH”, nieuwe editie, Moths 1: 351, 1961), is dit eigenlijk het enige biotoop, waar de vlinder is aangetroffen.

Maar in Nederland is *bankiana* zich de laatste decennia thuis gaan voelen in heel andere biotopen, droge zandgronden, al of niet bebost. Van tal van zulke plaatsen is het dier bekend geworden, veel te veel en veel te regelmatig, dan dat nog aan zwervers gedacht kan worden. We hebben hier een fraai voorbeeld van areaaluitbreiding door aanpassing aan diverse biotopen. Een bieuonder plezierig verschijnsel, want het oorspronkelijke biotoop verdwijnt hoe langer hoe meer.

De soort is nu ook van één van de waddeneilanden bekend geworden.

De vliegtijd kan tot in de eerste decade van augustus duren. De uiterste data worden nu: 13.V—8.VIII. De laatste datum werd in 1960 door FLINT waargenomen in het Boetelerveld. In sommige jaren komt echter nog een zeer kleine (en dus partiële) tweede generatie voor. Die is nu bekend uit de jaren 1957 (VAN DE POL), 1963 en 1964 (LEFFEF). De uiterste data ervan zijn: 26.VIII—22.IX. Ietwat twijfelachtig is de datum 16.VIII.1963, toen LEFFEF een exemplaar te Empe ving. Vermoedelijk is dit toch ook al een vertegenwoordiger van de tweede generatie geweest.

Vindplaatsen. Fr.: Terschelling (alleen in de Kooibosjes, LEFFEF), Wijnjeterp, Nijetrijne. Dr.: Paterswolde, Norg, Zuidlaren, Schoonlo. Ov.: Bergvennen, Denekamp, Volthe, Saasveld (Molenven), Enschede, Aamsveen, Balkbrug, Ommen, Oudleusen, Rechteren, Lemeerveld, Wechele, Boetelerveld, Raalte, Abdij Sion, Frieswijk, Tjoeue (droog dennenbos, LUKKIELEN), Schalkhaar, Colmschate, Deventer, Platvoet (lange spoordijk, LUKKIELEN), Olst (tussen eikenhout, idem). Gdl.: Epe, Hoog-Soeren, Assel, Apeldoorn, Laag-Soeren, Leuvenheim, Spankeren, Hoenderlo, Kootwijk, Kootwijkerveen, Gerritsfles, Wageningen, Bennekom, Lunteren; de Voorst, Warnsveld, Almen, Barchem, Ruurlo, de Boggelaar, Korenburgerveen, Winterswijk, Ratum, Kotten, Woold, Aalten, Ulenpas, Beek bij Didam, Montferland, Aerdt; Sint Jansberg (op het droogste gedeelte, GORTER), Slijk-Ewijk, Geldermalsen. Utr.: Amerongen, Leersum. N.H.: Naarden, Naardermeer, Hoorn, Overveen. Z.H.: Woerdense Verlaat, Noorden, Nieuwkoop, Arkel, Schelluinen, Ottoland, Hendrik-Ido-Ambacht (vier stuks in 1959, BOGAARD), Melissant (♂ in 1950, HUISMAN). Zl.: Burgh, Westenschouwen. N.B.: Wouw, Halsteren, Bergen op Zoom, Strijbeek, Drunen, Loon op Zand, Kampina, Boxtel, Waalre, Heeze, Maarheeze, Eindhoven, Nederwetten, Nuenen, Gerwen, Deurne, Liessel, Helenaveen, Sint Anthonis, Mill, Gassel. Lbg.: Plasmolen, Horst, Sevenum, America, Giendsveen (talrijk, LEFFEF), Nederweert, Weert, Moesel, Roggel, Beegden, Panheel, Heel, Ittervoort, de Hamert, Arcen, Lottum, Lomm, Tegelen, Belfeld, Swalmen, Maalbroek, Vlodrop, Montfort, Annendaal, Koningsbos, Echt, Susteren, Stein, Geleen, Schinveld, Brunssum, Gerendal, Meerssen, Bunde, Cadier en Keer, Gronsveld, Vijlen.

Variabiliteit. De exemplaren van de tweede generatie, die LEFFEF in september 1963 in de Peel aantrof, waren kleiner en donkerder dan die van de eerste generatie.

f. renigera nov. Bovenzijde voorvleugels: aan de binnenkant van de buitenste witte dwarslijn bevindt zich op de plaats, waar deze in de regel iets naar binnen gebogen is, een volledig ontwikkelde witte donker gekernde nierzvlek. Plaat 5 fig. 8 en 9. Slijk-Ewijk, ♂, 19.V.1960 (holotype), Winterswijk, ♂, 15.VI.1958, een exemplaar, dat tegelijk het kenmerk van *f. obsoleta* bezit (beide in collectie VAN DE POL).

[Upper side fore wings: on the inner side of the white postmedian a fully developed white reniform with dark centre in the place where this line, as a rule, is slightly bent inwards.]

f. edentata Lempke, 1949. Exemplaren zonder uitstekende tanden aan de eerste dwarslijn komen vrij regelmatig onder de soort voor.

f. signata Lempke, 1949. Exemplaren, waarbij de twee witte dwarslijnen door dunne zwarte lijnen afgezet zijn, zijn zeldzamer. Nieuwe vindplaatsen: Empe, Bergen op Zoom (Zoöl. Mus.); Kotten, Plasmolen, Lottum (VAN WISSELINGH); Noorden, Kampina, Heeze (LUCAS); Nuenen (NEIJTS); Annendaal (MAASSEN).

f. obsoleta Tutt, 1892, Brit. Noct. 4 : 7. Exemplaren, waarbij de twee witte banden sterk gereduceerd zijn en nog slechts als dunne witte lijntjes aanwezig zijn. Een prachtig ♂ ving LEFFEF 6.VII.1955 te Empe (Zoöl. Mus.). Een minder extreem exemplaar met smalle gebroken banden van Waalre (VAN WISSELINGH).

Dwergen. Hatert, Rijen, Best (Zoöl. Mus.).

Eustrotia uncula Clerck. *Tijdschr. Entom.* 90 : 90; Cat. VIII : (500). Met de lijst van 1949 mee een lange rij van vindplaatsen, die bewijst, dat de vlinder een sterke verbreiding in ons land heeft. Daar de rups volgens de literatuur niet alleen op zeggen, maar ook op ruwe grassen leeft, is het wel te verklaren, dat de vlinder in zijn voorkomen niet beperkt is tot moerassige plaatsen, al vormen die ook het

voornaamste biotoop voor de soort. Hij is nu ook op drie van de waddeneilanden aangetroffen.

De eerste generatie kan al in de eerste meidagen beginnen te vliegen en in gunstige seizoenen waarschijnlijk zelfs al in de laatste week van april. De uiterste data ervan zijn nu: 1.V—20.VII. De tweede generatie is nog tot in september waargenomen. De laatste datum ervan wordt nu: 10.IX (in 1955, Kooi).

Vindplaatsen. Fr.: Ameland, Terschelling (vrij gewoon in 1956 en 1957, LEFFEF), Vlieland, Leeuwarden, Tietjerk, Olerterp, Duurswoude, Bakkeveen, Haule, Wijnjeterp, Fochtelo, Oosterwolde, Oudehorne, Oldeberkoop, Nijetrijne, Oudemirdum, Delburen. Gr.: Zevenhuizen (Leek), Glimmen, Noordlaren, Veendam. Dr.: Roden, Steenbergen, Lieveren, Norg, Westervelde, Veenhuizen, Paterswolde, Eelderwolde, De Punt, Donderen, Vries, Schipbeek, Zuidlaren, Eext, Gieten, Gasselte, Schoonlo, Hooghalen, Ruinen, Hoogeveen. Ov.: Denekamp, Volthe, Ootmarsum, Vasse, Agelo, Reutum, Albergen, Bornerbroek, Delden, Balkbrug, Beerze, Oudleusen, Rechteren, Dalfsen, Gerner, Lemelerveld, Boetelerveld, Abdij Sion, Zwartsluis, Vollenhove, Marknesse. Gdl.: Staverden, Epe, Wiessel, Hoog-Soeren, Teuge, Uchelen, Empe, Tonden, Deelen, Wolfheze, Hoenderlo, Otterlo, Gerritsfles, Harskamp, Kootwijk, Kootwijkerveen, Gorssel, Eefde, Ruurlo, Korenburgrerveen, Wooldse veen, Hoog-Keppe, Babberich; Groesbeek, Slijk-Ewijk, Geldermalsen. Utr.: Bilthoven, Achttienhoven, Botshol. N.H.: 's-Graveland, Naardermeer, Callantsoog, Heemskerk, Overveen, Aerdenhout. Z.H.: Woerdense Verlaat, Noorden, Nieuwkoop, Asperen, Arkel, Schelluinen, Ottoland, Hendrik-Ido-Ambacht (één exemplaar in 1959, BOGAARD), Oostvoorne, Hellevoetsluis, Melissant (1966, HUISMAN), Ouddorp. Zl.: Burgh, Haamstede, Westenschouwen, Oostkapelle, Goes, Cadzand. N.B.: Strijbeek, Waalwijk, Drunen, Haaren, Kampina, Sint Michielsgestel, Boxtel, Bergeijk, Eindhoven, Someren, Helenaveen, Erp, Mill, Gassel. Lbg.: Well, de Hamert, Lomm, Swalmen, Roggel, Moesel, Herkenbosch, Melick, Sint Odiliënberg, Montfort, Stein, Huls, Wijlre, Geulem, Gronsveld.

Variabiliteit. *f. rufotincta* Kolb, 1930, *Mitt. Münchener ent. Ges.* 20 : 62. Grondkleur van de voorvleugels van een warm roodbruine tint. Hatert (VAN WISSELINGH); Noorden, Wouw (LUCAS); Deurne (Br. ANTONIUS).

f. obscurior Spuler, 1907. Grondkleur sterk verdonkerd, ook de tekening die anders licht is, is bruinachtig getint. Nuenen (NEIJTS); de Peel (Helenaveen), een exemplaar, waarbij de voorvleugels bruinzwart zijn met donkere costa en de achtervleugels eveneens verdonkerd zijn (NIES).

f. lineola Dannehl, 1926. Vrijwel overal onder de soort, een lange rij van vele vindplaatsen in Zoöl. Mus.

f. clarivittata Nordström, 1940 (*clarivittata* Lucas, 1959, *Ent. Ber.* 19 : 205). De vorm met een brede witachtige achterrandsband (en in de regel ook brede lichte voorrand) is niet zo gewoon, maar blijkbaar ook tamelijk verbreid. Noordlaren, Marknesse, Bennekom, Wageningen (VAN DE POL); Almen, Nieuwkoop, Kampina (LUCAS); Melissant (HUISMAN); Nuenen (VERHAAK).

f. triangulata Lempke, 1949. Niet zeldzaam, verbreid onder de soort.

f. pupillata Lempke, 1949. Hetzelfde geldt voor exemplaren met donker gekernde nervulek.

f. bipartita nov. De langgerekte lichte nervulek in tweeën gedeeld. Plaat 5 fig. 10. Hendrik-Ido-Ambacht, ♀, 9.VII.1959 (holotype, BOGAARD).

[The long pale reniform divided into two parts.]

Teratologisch exemplaar. Linker voorvleugel te klein. Meerssen (RIJK).

Emmelia Hübner

Emmelia trabealis Scopoli. *Tijdschr. Entom.* 90 : 92; Cat. VIII : (502). Het geregeldst komt de vlinder bij ons in het zuiden en midden van Limburg voor, al is het ook hier meestal beslist geen gewoon dier. In elk geval is het toch steeds een slechts plaatselijk voorkomende soort. Buiten deze provincie alleen enkele vangsten in Gelderland en Noord-Brabant.



Fig. 45. Histogram van *Emmelia trabealis* Scopoli.

De eerste generatie kan al in de eerste helft van mei beginnen te vliegen. De vroegste datum is nu: 12 mei. Toen werd in 1960 een exemplaar te Slijk-Ewijk gevangen (VAN DE POL). De laatste datum van de tweede generatie blijft 10.VIII. Uit het hierbij gegeven histogram (fig. 45) blijkt, dat de beste tijd voor de eerste generatie de eerste helft van juni is. De tweede generatie is duidelijk schaarser. Er zijn althans minder gegevens over beschikbaar. De hoofdvliegijd hiervan schijnt de eerste helft van juli te zijn, wat dan wel op een snelle ontwikkeling van deze generatie moet wijzen. Heel laat is een exemplaar, dat TOLMAN 27.IX.1948 te Milsbeek ving (zeer partiële derde generatie?).

Vindplaatsen. Gdl.: de Voorst (1953, LEFFEF); Slijk-Ewijk (1960, VAN DE POL). N.B.: Sint Michielsgestel (1950, KNIPPERBERG); Eindhoven (1954, 1955, VAN DULM); Heeze (1959, BENTINCK). Lbg.: Milsbeek (1948, TOLMAN); Horst (1960, LEFFEF); Swalmen (1950—1954, diverse verzamelaars); Sint Odiliënberg (1948, Mus. Rotterdam; 1949, LÜCKER; 1960, VERBEEK); Linne (1953, LÜCKER); Montfort (1960, MAASEN); Echt (1959, VAN AARTSEN); Sint Joost (1960, idem).

f. confluens Stauder, 1924. Echt (Zoöl. Mus.).

f. nigricosta Stauder, 1924. De drie exemplaren in het Zoöl. Mus. zijn alle overgangsexemplaren, waarbij wel de twee basale gele vlekjes langs de costa verdwenen zijn, maar niet het derde.

Acontia Ochsenheimer

Acontia lucida Hufnagel. *Tijdschr. Entom.* 90 : 196; Cat. VIII : (606). Van dit fraaie dier is tot nog toe geen tweede exemplaar uit ons land bekend geworden. Ook uit het omringende gebied zijn geen nieuwe gegevens te vermelden.

Acontia luctuosa Schiff. Ook van deze soort is slechts één enkele vangst uit Nederland bekend (1963). In Denemarken werd op 15.VII.1949 het eerste exemplaar op Bornholm gevangen (1949, *Flora og Fauna* 55 : 116), het tweede in 1965 op Seeland (op. cit. 72 : 122, 1966). Uit het omringende Duitse gebied vermeldt PEETS het dier als zeer zeldzaam voor de omgeving van Hannover.

(*Jahresber. Naturhist. Ges. Hannover* 55—57 : 247, 1908). Uit België wordt de vlinder vermeld van verschillende plaatsen in het zuiden van de provincies Namen en Luxemburg. Op de Britse eilanden is *luctuosa* bekend van het zuiden van Engeland en is vooral langs de kuststrook van het zuidwestelijk deel gewoon.

Van vliegtijd is hier te lande uiteraard vrijwel niets bekend. Het exemplaar werd in de tweede helft van juli gevangen.

Vindplaats. N.H.: Heemskerk, 22.VII.1963 (VAN AARTSEN, afgebeeld plaat 5 fig. 13).

NYCTEOLINAE

Nycteola Hübner

Nycteola revayana Scopoli. *Tijdschr. Entom.* 90 : 92; Cat. VIII : (502). In verband met het voorkomen van rupsen op eik is de soort in hoofdzaak beperkt tot de zandgronden, maar hier is hij dan ook goed verbreid. Toch is het geen soort, die gewoon genoemd kan worden. De aantallen, die met de menglicht-lampen gevangen worden, zijn in de regel klein. Wanneer men het materiaal in de oudere collecties bekijkt, rijst het vermoeden, dat de vlinder toen gewoner was (en veel variabeler) dan nu. Het is mogelijk, dat met het verdwijnen van de cultuur van eikehakhout (voor de schors) ook het voor de rups meest geschikte biotoop is achteruit gegaan.

Naast de vindplaatsen op de zandgronden zijn er vrij veel daarbuiten bekend geworden. Voor een deel is dit te verklaren door het feit, dat de eik niet beperkt is tot deze grondsoort, maar een aantal van deze vondsten moeten betrekking hebben op zwervers, daar ze afkomstig zijn van plaatsen, waar wijd en zijd geen eik te bekennen is. De vlinder is nu bekend van één van de waddeneilanden.

Wat de vliegtijd betreft, er is nauwelijks een grens tussen de beide generaties, daar LUCAS na 19.VIII nog 20.VIII (1944) en 21.VIII (1960) vermeldt, al zal er in elk jaar waarschijnlijk wel een korte onderbreking zijn. De tweede generatie kan bij gunstig weer tot in december blijven vliegen (7.XII.1956, LUCAS), terwijl overwinterde exemplaren reeds half maart kunnen verschijnen (vroegste datum nu: 16.III, in 1950 waargenomen te Twello door COLDEWEIJ).

Vindplaatsen. Fr.: Terschelling (enkele, LEFFEF), Wijnjeterp. Gr.: Glimmen. Dr.: Roden, Schoonlo, Wijster. Ov.: Volthe, Raalte, Abdij Sion, Frieswijk, Holten, Colmschate, Vollenhove. Gdl.: Ermelo, Epe, Wiessel, Hoog-Soeren, Otterlo, Lunteren; Gorssel, Warnsveld, Ruurlo, Boekelo, Korenburgerveen, Hoog-Keppel, Didam, Loerbeek; Slijk-Ewijk. Utr.: Rhenen, Doorn, Bunnik, Bilthoven, Amersfoort, Hollandse Rading, Botshol (WOLSCHRIJN). N.H.: Valkeveen, Naardermeer, Weesp, Amsterdam (1959, PEERDEMAN), Halfweg (1960, VAN AARTSEN), Schoorl, Heemskerk, Heemstede. Z.H.: Den Haag, Rotterdam (LUCAS), Dordrecht (1964, BOGAARD), Oostvoorne, Melissant (1960, HUISMAN). Zl.: Burgh, Haamstede, Westenschouwen, Oostkapelle, Valkenisse, Cadzand. N.B.: Hoogerheide, Haaren, Sint Michielsgestel, Bergeijk, Valkenswaard, Someren, Helenaveen, Sint Anthonis, Gassel. Lbg.: Grubbenvorst, Tegelen, Belfeld, Swalmen, Heel, Montfort, Nieuwstadt, Brunssum, Treebeek, Maastricht, Gronsveld, Epen, Camerig, Vijlen.

Variabiliteit. Exemplaren, die met SCOPOLI's beschrijving overeenstemmen, zijn nog altijd niet in ons land aangetroffen.

f. *grisea* ter Haar, [1899 of 1900]. Exemplaren met grijze voorvleugels en de zwarte streep uit de wortel werden nog bekend van: Ermelo (VAN DER MEULEN);

Rhenen (Landb. Hschool); Doorn (VAN DER WOLF); Zeist (GORTER); Weesp (Zoöl. Mus.); Epen (VAN WISSELINGH).

f. *ramosana* Hübner, 1793. Van de vorm, waarbij de voorvleugels boven de streep bruin zijn en eronder grijs, werden de volgende nieuwe vindplaatsen bekend: Lage Vuursche, Bussum (Zoöl. Mus.); Belfeld (OTTENHEIJM). VAN WISSELINGH bezit een exemplaar van Wassenaar, waarbij bijna de gehele voorvleugel bruin is, behalve langs de achterrand, die grijs is. Dit kan toch wel het beste tot *ramosana* gerekend worden.

f. *atrata* Sheldon, 1919. Van deze zeer donkere vorm, waartoe ik ook de zwartachtige zonder bruine tint (maar waarbij de diepzwarte *ramosana*-streep nog steeds duidelijk afsteekt) zou willen rekenen, werden nog exemplaren gevangen te Ruurlo (LUKKIEN), Aalten (VAN GALEN), Zeist (GORTER), Bussum (KUCHLEIN), Bergeijk, Epen (VAN WISSELINGH), Sint Anthonis (PEERDEMAN).

f. *dilutanaoides* Lempke, 1958, *Ent. Ber.* 18 : 163 (*dilutana* auct. nec Hübner). De vorm is beslist niet gewoon. Nieuwe vindplaatsen: Doorn (Zoöl. Mus.); Aerdenhout (VAN WISSELINGH).

f. *fusculana* Schmid, 1885. Ook van deze vorm slechts enkele nieuwe vindplaatsen: Aerdenhout, Epen (VAN WISSELINGH).

f. *obsoleta* Sheldon, 1919. Nieuwe vindplaatsen: Bussum (Zoöl. Mus.); Aerdenhout, Wassenaar (VAN WISSELINGH).

f. *lathamiana* Swederus, 1787. Nieuwe vindplaatsen: Arnhem, Laren-Gdl. (Zoöl. Mus.).

f. *ilicana* Fabricius, 1781. Nieuwe vindplaatsen: Lage Vuursche, Bussum, Oostkapelle, Valkenisse, Vijlen (Zoöl. Mus.).

f. *notata* Sheldon, 1919. De zilvergrijze vorm met zwarte stippen werd gevangen te Montfort (MAASSEN).

f. *afzeliana* Swederus, 1787. Rotterdam (LUCAS).

f. *adusta* Sheldon, 1919. Epen (VAN WISSELINGH).

f. *lichenodes* Sheldon, 1919. Putten (Zoöl. Mus.).

f. *undulana* Hübner, [1796]. Hoofdvorm.

f. *plumbea* Sheldon, 1919. Bussum (Zoöl. Mus.).

f. *melanosticta* Sheldon, 1919. Apeldoorn, Aerdenhout (VAN WISSELINGH); Bunnik (C. DE JONG).

f. *nigricans* Sheldon, 1919. Gewoon.

f. *conuncta* Cockayne, 1951, *Ent. Rec.* 63 : 162. Bovenzijde voorvleugels: van de nervlek loopt een zwarte streep naar de eerste dwarslijn. Arnhem, 1871 (Zoöl. Mus.); Amersfoort (Landb. Hschool).

Nycteola degenerana Hübner. *Tijdschr. Entom.* 90 : 95; Cat. VIII : (505). Uit ons land zijn geen nieuwe gegevens bekend geworden. De soort is hier stellig niet inheems.

(De laatste jaren zijn in de buitenlandse literatuur verschillende publicaties over het geslacht *Nycteola* verschenen. De uitvoerigste is de monografie van Ch. DUFAY, Révision des *Nycteola* Hübner (*Sarrothripus* Curtis) paléarctiques, *Ann. Soc. ent. France* 127 : 107—132, pl. II en III, 1958. Er blijken in de westelijke helft van Europa niet minder dan vijf verschillende soorten voor te komen.

In het omringende gebied is behalve de twee uit Nederland bekende nog *N. asiatica* Krulikovski aangetroffen (één vondst in Denemarken, verschillende in het uiterste zuiden van Belgisch Luxemburg). Deze soort heeft eveneens groene voorvleugels, maar is kleiner dan *degenerana* (net als *revayana*) en heeft meer hoekige voorvleugels. Heel goed zijn de verschillen te zien in HOFFMEYER's Danske Ugler, 2de druk, plaat 22, fig. 19 en 20 (1962). Behalve de vangsten van *asiatica* in het zuiden van België maken overigens alle andere in onze omgeving, zowel van *degenerana* als van *asiatica*, de indruk, dat we met zwervers te doen hebben).

Earias Hübner

Earias clorana L. *Tijdschr. Entom.* 90 : 99; Cat. VIII : (509). Zeer verbreid in ons land, vooral in het lage deel. Opvallend veel nieuwe vindplaatsen in het Hafdistrict en in het Fluviaziel District, wat natuurlijk in verband staat met de levenswijze van de rups, die in de samengesponnen topscheuten van smalbladige wilgen leeft, vooral van *Salix alba* en *Salix viminalis*. Nu van drie van de waddeneilanden bekend.

De eerste generatie kan reeds in de laatste week van april beginnen te vliegen. De vroegste datum is nu: 25.IV (1946, Stein, collectie Missiehuis), de laatste 12.VII. Het is thans zeker, dat in gunstige jaren nog een partiële derde generatie kan voorkomen. Na 28.VIII, de laatste in 1949 bekende datum, werden exemplaren gevangen op 1.IX.1959, 1 en 2.IX.1961, 4.IX.1957 en 1959, 10.IX.1956, 16.IX.1965 (koud en laat jaar). Mogelijk zijn dit althans gedeeltelijk nog late vertegenwoordigers van de tweede generatie geweest. Zekere derde generatie dieren waren echter: 20.IX.1956, Stein (Missiehuis), 13.IX.1959, vers exemplaar, Hendrik-Ido-Ambacht (BOGAARD), 15, 16 en 21.IX.1963, Arkel (ZWAKHALS), 2.X.1959, vers exemplaar, Heemskerk (VAN AARTSEN), 7.X.1961 en 18.X.1962, Hendrik-Ido-Ambacht (BOGAARD).

Vindplaatsen. Fr.: Terschelling, Vlieland, Sexbierum, Leeuwarden, Tietjerk, Ternaard, Eernewoude, Wijnjeterp, Nijetrijne, Oudemirdum, Nijemirdum, Dedgum, Tjerkwerd. Gr.: Glimmen. Dr.: Westervelde, Norg, Donderen, Schoonlo, Ruinen. Ov.: Volthe, Albergen, Almelo, Vriezenveen, Holten, Balkbrug, Rechteren, Dalfsen, Abdij Sion, Platvoet, Zwartsluis, Vollenhove, Kalenberg. Flevoland: Lelystad. Gdl.: Harderwijk, Vierhouten, Wiessel, Terwolde, Uchelen, Empe, Laag-Soeren, Gerritsfles, Wageningen, Bennekom; Gorssel, Eefde, Warnsveld, Almen, Ruurlo, Hoog-Keppel, Aerdt, Groessen; Berg en Dal, Slijk-Ewijk, Neerijnen. Utr.: Amersfoort, Utrecht, Harmelen, Botshol. N.H.: 's-Graveland, Naarden, Naardermeer, Muiden, Weesp, Halfweg, Katham, Beemster, Wormerveer, Oost-Knollendam, Hoorn, Koog-Texel, Schoorl, Bergen, Castricum, Bakum, Heemskerk, Velzen, Overveen, Haarlem, Aerdenhout, Heemstede, Vogelenzang. Z.H.: Woerdense Verlaat, Noorden, Nieuwkoop, Noordwijk, Oegstgeest, Wassenaar, Leidschendam, Voorburg, Delft, Vlaardingen, Krimpen aan den IJssel, Krimpen aan de Lek, Reeuwijk, Asperen, Arkel, Schelluinen, Hendrik-Ido-Ambacht, Hoogvliet, Oostvoorne, Rockanje, Hellevoetsluis, Middelharnis, Melissant, Ouddorp. Zl.: Burgh, Haamstede, Westenschouwen, Oostkapelle, Koudekerke, Valkenisse, Kamperland, Goes, Cadzand. N.B.: Galder, Strijbeek, Chaam, Waalwijk, Sint Michielsgestel, Kampina, Boxtel, Best, Eindhoven, Geldrop, Helmond, Helenaveen, Sint Anthonis. Lbg.: Griendsveld, Sevenum, Moesel, Roggel, Steijl, Tegelen, Swalmen, Maasniel, Montfort, Echt, Stein, Heerlerbaan, Chèvremont, Eijs, Geulem, Bunde, Heer, Kannerbos, Sint Pietersberg, Gronsveld, Epen, Vijlen, Vaals.

Varia bilit eit. De groene kleur van de voorvleugels varieert iets in tint.

f. lacticolor nov. Voorvleugels roomwit, deaderen, die bij typisch gekleurde exemplaren donkerder groen zijn, zijn nu donkerder grijs. Arkel, ♀, 5.VIII.1960 (holotype, ZWAKHALS).

[Fore wings creamy white, the nervures, darker green in typically coloured specimens, are now darker grey.]

Dwerg. Bennekom (VAN DE POL).

Earias vernana Fabricius. Tot nog toe is slechts één exemplaar bekend, dat in 1954 in het noorden van het land werd gevangen. Volgens de literatuur leeft de rups uitsluitend op de witte abeel en dat is nu niet bepaald een algemeen voor- komende boom in Nederland.

In Denemarken is de vlinder lokaal, maar komt op alle grote eilanden voor en is ook bekend van Jutland. De vlinder zelf wordt niet veel aangetroffen, maar de rups komt vaak in aantal voor (zie HOFFMEYER, De Danske Ugler, 2de druk: 327—328, 1962). In het noordwesten van Duitsland is *vernana* bekend van Sleeswijk-Holstein (één exemplaar in 1937), van de omgeving van Hamburg (twee oude vondsten in 1895 en 1909, daarna weer op licht in 1952, 1953 en 1954), bij Bremen (een ♀ in 1934), van Hannover (één exemplaar in 1951 op licht bij de stad) en verder in het bergachtige deel: Göttingen, Bückeburg. Niet bekend uit Westfalen. In de voormalige Rijnprovincie een ♀ bij Düsseldorf in 1910 en een ♂ zonder datum van Krefeld. Niet aangetroffen in België en op de Britse eilanden.

Van vliegtijd is hier uiteraard vrijwel niets bekend. In Denemarken heeft de vlinder twee generaties van mei tot in augustus.

Vindplaats. Dr.: Donderen, 5.VI.1954 (BLOM, afgebeeld plaat 5 fig. 12).

Hylophila Hübner

Hylophila fagana Fabricius (*prasinana* auct.). *Tijdschr. Entom.* 90: 99; Cat. VIII: (509). De soort met de drie zilverkleurige dwarslijnen op de voorvleugels. De in 1949 gegeven verbreiding is goed, al zijn heel wat nieuwe vindplaatsen bekend geworden. Hierbij zijn ook enkele in het Hafdistrict en het Fluviaal District, die beslist van zwervers afkomstig moeten zijn. De vlinder is nu van twee van de waddeneilanden bekend.

De normale eerste generatie kan tot in de tweede helft van juli vliegen, zodat de uiterste data nu worden: 24.IV—24.VII (de late datum in 1962 te Stein, collectie Missiehuis). De zeer partiële tweede generatie, die zeker niet alle jaren voorkomt, werd aangetroffen in 1952 (Apeldoorn, Bennekom), vooral in 1953 (Apeldoorn, Bennekom, Aerdenhout, Melissant), in 1955 en 1957 (Wiessel, Apeldoorn), van 12.VIII—1.IX. Merkwaardig is vooral het ♂ (stellig een zwerver), dat HUISMAN 12.VIII.1953 te Melissant ving, terwijl er nog nooit een exemplaar van de eerste generatie is gezien!

Vindplaatsen. Fr.: Terschelling (weinig, vooral in het beboste westen, LEFFEF), Tietjerk, Beetsterzwaag, Olterterp, Duurswoude, Wijnjeterp, Oosterwolde, Oudehorne,

Nijetrijne, Balk, Nijemirdum, Oudemirdum. Gr.: Noordlaren. Dr.: Eelde, Roden, Een, Norg, Westervelde, Eext, Schoonlo. Ov.: Ootmarsum, Volthe, Saasveld (Molenven), Enschede, Ommen, Rechteren, Raalte, Abdij Sion, Colmschate, Zwartsluis. Gdl.: Ermelo, Hulshorst, Nunspeet, Soerel, Hattem, Epe, Wiessel, Hoog-Soeren, Assel, Uchelen, Beekbergen, Ellecom, Hoenderlo, Otterlo, Bennekom, Ede; Eefde, Warnsveld, Lochem, Ruurlo, Hoog-Keppel; Groesbeek, Hatert. Utr.: Amerongen, Doorn, Overlangbroek, Soesterberg, Soestduinen, Lage Vuursche. N.H.: 's-Graveland, Blaricum, Amsterdamse Bos (matig, PEERDEMAN), Halfweg (26.VI.1960, ♀, VAN AARTSEN), Den Burg (Texel, P. A. SMIT), Schoorl, Bergen aan Zee, Heemskerk, Santpoort, Aerdenhout, Heemstede. Z.H.: Leiden, Wassenaar, Duinrel, Scheveningen, Staelduin, Rotterdam (Kralinger Hout), Arkel (drie exemplaren op 8.VI.1961, ZWAKHALS), Hendrik-Ido-Ambacht (in 1962 en in 1963 telkens één exemplaar, BOGAARD), Melissant (12.VIII.1953, ♂, HUISMAN), Ouddorp. Zl.: Haamstede, Westenschouwen, Oostkapelle. N.B.: Dorst, Galder, Strijbeek, Ulvenhout, Teteringen, Nieuwkuik, Sint Michielsgestel, Boxtel, Kampina, Eindhoven, Heeze. Lbg.: Griendsveld, Sevenum, Tegelen, Belfeld, Swalmen, Sint Odiliënberg, Meijnwegen, Montfort, Stein, Schinveld, Brunssum, Heerlen, Valkenburg, Maastricht, Gronsveld, Bocholtz, Epen, Vijlen.

Variabiliteit. f. fiorii Costantini, 1911 (*bilinea* Richardson, 1952, *Ent. Rec.* 64 : 271, pl. XI fig. 26). Exemplaren van de tweede generatie, die aan de beschrijving voldoen, zag ik van: Apeldoorn (LUCAS); Bennekom (VAN DE POL); Aerdenhout (VAN WISSELINGH); Melissant (HUISMAN).

(De tweede generatie is nu ook uit Engeland bekend, maar werd ook daar weer als een nieuwe vorm beschreven. Blijkens de foto komt de loop van de twee aanwezige dwarslijnen geheel overeen met de beschrijving van COSTANTINI).

f. sylvana Fabricius, 1794. Exemplaren zonder de binnenste dwarslijn op de voorvleugels werden nog aangetroffen te: Apeldoorn (Zoöl. Mus.); Nijmegen, Haarlem, Aerdenhout (VAN WISSELINGH); Vijlen (PEERDEMAN).

f. bilineata Slevogt, 1901. Exemplaren zonder de buitenste dwarslijn op de voorvleugels werden nog bekend van: Eext, Wiessel, Apeldoorn, Heemskerk (Zoöl. Mus.); Ruurlo (LUKKIEN); Soestduinen (BERK); Bussum (TER LAAG); Santpoort (AUKEMA); Aerdenhout (VAN WISSELINGH); Heemstede (VON HERWARTH); Wassenaar (LUCAS); Den Haag (Landb. Hschool); Valkenburg (TER LAAG).

f. unilinea nov. Bovenzijde voorvleugels: van de drie dwarslijnen is alleen de buitenste aanwezig. Paterswolde, ♂, 15.IV.1930, e. l. (holotype, Landb. Hschool).

[Upper side fore wings: only the outermost transverse line is present.]

f. ♂ millieri Capronnier, 1883. Nieuwe vindplaatsen van de vorm met rode middelste dwarslijn en binnenrand van de voorvleugels zijn: Abdij Sion (FLINT); Apeldoorn, Den Haag (Zoöl. Mus.); Bennekom (BRANGER); Amerongen, Zeist (GORTER); Bussum (TER LAAG); Santpoort (AUKEMA); Wassenaar (VAN WISSELINGH); Montfort (MAASSEN). Blijkbaar vrij verbreed onder de soort.

f. ♀ rubrociliata Obraztsov, 1950, *Ent. Z. Frankfurt* 60 : 72. De franje van de voorvleugels over de hele lengte roodachtig, net als bij het ♂. Zeker geen zeldzame vorm. Of hij genetisch iets te maken heeft met de vorige is niet bekend. Beetsterzwaag (G. DIJKSTRA); Deventer, Putten, Tongeren, Apeldoorn, Soest, Hilversum (Zoöl. Mus.); Ruurlo (LUKKIEN); Zeist (GORTER); 's-Graveland (WESTERNENG); Deurne (NIES).

f. caerulescens Lempke, 1949. Nieuwe vindplaatsen van deze blauwgroene

vorm: Abdij Sion, ♀, 1963 (FLINT); Apeldoorn, twee wijfjes (Zoöl. Mus.); Heemstede (VAN DE POL).

f. *flava* Spuler, 1906, Schmetterl. Eur. 2 : 126 (*xanthophilana* Obraztsov, 1943, *Iris* 56 : 157). Grondkleur van de voorvleugels diepgeel, met donkerder gele strepen (de schaduwen langs de nu nauwelijks zichtbare dwarslijnen); achtervleugels lichter geel. Een prachtig gaaf ♂ van Apeldoorn, 19.VI.1957 (LEFFEF leg., Zoöl. Mus.).

[In 1950 (l. c.) OBRAZTSOV declares his *xanthophilana* not to be identical with Spuler's *f. flava*. However the differences indicated by him are mainly caused by the fact that SPULER described his form after a ♂, whereas OBRAZTSOV's *xanthophilana* is a ♀.]

Bena Billberg

Bena prasinana L. (*bicolorana* Fuessly, 1775). *Tijdschr. Entom.* 90 : 100; Cat. VIII : (510). De grotere soort met de twee gele dwarslijnen op de voorvleugels. Evenals de vorige soort vooral verbreid in bosachtige gebieden, maar over het algemeen toch iets minder gewoon, althans als imago. Opmerkelijk is ook, dat vrijwel geen zwervers buiten het normale biotoop bekend zijn. Een interessante opmerking schreef LEFFEF me over het dier: „Mijn ervaring is, dat van de soort meer rupsen gevonden worden dan imagines, die bovendien niet goed op licht komen. Ook lijkt het me toe, dat er iets van achteruitgang is te merken. Een feit is, dat de rupsen niet op struiken leven, maar vooral in bossen bestaande uit uitgegroeide eikespaartelgen en in niet al te zwaar gestamde eiken-berkenbossen.” De vlinder is nu bekend van één van de waddeneilanden.

Geen correctie op de vlietijd.

Vindplaatsen. Fr.: Terschelling (enkele in 1956, LEFFEF), Leeuwarden, Tietjerk, Beetsterzwaag, Oudemirdum. Gr.: Veendam, Vlagtwedde. Dr.: Peize, Norg, Donderen, Zeijen, Schipborg, Zuidlaren, Assen, Schoonlo, Odoornerveen, Hooghalen, Vledder, Havelte. Ov.: Ootmarsum, Volthe, Enschede, Boekelo, Raalte, Abdij Sion. Gdl.: Ermelo, Tongeren, Wiessel, Hoog-Soeren, Assel, Uchelen, Hoog-Buurlø, Hoenderlo, Laag-Soeren, Wolfheze, Bennekom; Eefde, de Voorst, Almen, Hoog-Keppel; Hatert, Grootbos, Neerijnen. Utr.: Doorn, Achterveld, Amersfoort, Soesterberg. N.H.: 's-Graveland, Blaricum, Huizen, Bergen, Heemskerk, Bloemendaal, Aerdenhout, Zandvoort. Z.H.: Oegstgeest, Wassenaar. Zl.: Westenschouwen. N.B.: Ulvenhout, Hilvarenbeek, Waalwijk, Sint Michielsgestel, Haaren, Oisterwijk, Kampina, Schijndel, Middelbeers, Bergeijk, Eindhoven, Someren, Helenaveen, Mill. Lbg.: Mook, Velden, Tegelen, Sevenum, Meijnweg, Montfort (in 1963 massaal, daarna weinig, MAASSEN), Linne, Echt, Stein, Amstenrade, Brunssum, Geulem, Bunde, Cannerbos, Gronsveld, Eperheide, Vijlen, Vaals.

Note. The specific nomenclature of the last two species is in accordance with my article on this subject in *Entomologist* 80 : 127—132 (1947), notwithstanding the note I published in part X of the Catalogue : (806)—(807) (1951). Mr. D. S. FLETCHER (British Museum, Nat. Hist.) wrote to me: "Your article of 1947 quite clearly selects a lectotype. The paragraph "Through the intermediary but the moth is the type, contemporary with Syst. Naturae ed. X" is beyond dispute.

Whatever second thoughts you may have had or whatever the views of Dr. DE LATTIN may be, this settlement of the name cannot be altered without a sanction of the Commission for Zoological Nomenclature."

The same specific nomenclature as in the present supplement is to be found in the new edition of "SOUTH".

PANTHEINAE

Panthea Hübner

Panthea coenobita Esper. *Tijdschr. Entom.* 82 : 197; Cat. IV : (204). Er zijn op het ogenblik twee verspreidingsgebieden in Nederland bekend, nl. het zuiden en midden van Limburg (op zichzelf ook weer geen samenhangend gebied) en een deel van de oostelijke helft van Drente. Dank zij de inventarisaties van het RIVON blijkt de vlinder in het laatstgenoemde gebied zelfs gewoner te zijn dan in het zuiden van het land. Toch heeft hij zich hier waarschijnlijk pas kunnen vestigen na de aanleg van de Staatsbossen. De rups leeft op spar, den (volgens HOFFMEYER in „De Danske Ugler”, 2de druk : 15 vooral op Weymouth-den) en lork. En juist deze laatste is in Drente in flink aantal aangeplant.

In Denemarken is de vlinder thans niet alleen van de meeste eilanden bekend, maar ook van tal van plaatsen in Jutland. In Sleeswijk-Holstein heeft *coenobita* zich de laatste decenniën over het gehele gebied verbreid en is daar nu een ge-regelde, maar niet talrijk voorkomende verschijning op de lamp (*Mitt. faun. Arb.-gemeinsch. Schleswig-Holstein, Hamburg u. Lübeck*, N.F. 5 : 43, 1952). In het linker gedeelte van de voormalige Rijnprovincie werd de vlinder aangetroffen bij Elmpt (1939) en bij Hüls (in 1941).

Volgens de nu bekende gegevens duurt de vliegtijd bij ons van half mei tot in de tweede helft van juli (18.V—19.VII).

Vindplaatsen. Gr.: Glimmen (VAN DE POL). Dr.: Eext (1.VII.1963, elf exemplaren, WITMOND); Schoonlo (in 1960 en volgende jaren, vrij gewoon, LEFFEF). Lbg.: Montfort (5.VII.1957, MAASEN); Brunssum (7.VII.1946, GIELKENS; 25.VI.1957, CLAASSSENS); Geulem (20.VI.1953, HARDONK, in Zoöl. Mus.); Epen (15.VII.1954, VAN DE POL, 1.VII.1966, VAN DER WOLF); Vaals (27.VI.1936, LANGOHR, eerste vangst in Nederland! JUSSEN, diverse exemplaren tussen 18.VI. en 8.VII; PIJPERS en JACOBI in 1947).

Variabiliteit. De zwarte tekening op de voorvleugels kan nu eens sterker, dan weer zwakker zijn. Enkele exemplaren zijn ter illustratie hiervan afgebeeld op plaat 5 fig. 14—16.

Colocasia Ochsenheimer

Colocasia coryli L. *Tijdschr. Entom.* 82 : 198; Cat. IV : (205). De vlinder blijkt ook in bosachtig terrein buiten de zandgronden voor te kunnen komen. VAN DER AA trof hem in de Kralinger Hout (Rotterdam) aan. In het Amsterdamse Bos is hij tot nu toe echter nog niet opgemerkt. Van de waddeneilanden is *coryli* nu bekend van Terschelling (1956, LEFFEF) en van Texel (Koog, 1959, FISCHER). In beide gevallen werd slechts één exemplaar gevangen, zodat de vlijnder er blijkbaar nog niet gewoon is. Vindplaatsen buiten bosachtig terrein zijn niet bekend geworden, met uitzondering van Zwartsluis (HARSEVOORD).

De eerste generatie kan tot half mei vliegen. De uiterste data ervan zijn nu: 8.IV—12.VI. De tweede kan nog tot in september voorkomen, zodat de grenzen ervan nu worden: 6.VII—5.IX. De laatste datum werd door LUCAS genoteerd in 1956.

Variabiliteit. De vlinder is zeer variabel in allerlei kleine details, zowel wat de tekening als wat de kleuren betreft.

f. avellanae Huene, 1901. De vorm met eenkleurig grijze maar duidelijk getekende voorvleugels is niet zeldzaam en komt vrijwel overal onder de soort voor.

f. medionigra Vorbrot, 1911. Hetzelfde geldt voor de vorm met zwartbruin middenveld van de voorvleugels.

f. seminigra nov. Bovenzijde voorvleugels: wortelveld en middenveld zwart-achtig, achterrandsveld vrijwel normaal. Ruurlo, ♂, 1.VIII.1962 (holotype, LUKKIE).

[Upper side fore wings: basal and central areas blackish, outer area practically normal.]

f. melanotica Haverkampf, 1906, *Ann. Soc. ent. Belg.* 50 : 158. Voorvleugels eenkleurig zwart met nog zichtbare tekening; achtervleugels eveneens verdonkerd. Plaat 6 fig. 1. Zonder enige twijfel een moderne melanistische vorm. De auteur beschreef hem naar een exemplaar, dat in het begin van deze eeuw bij Elberfeld gevangen was. Bij Hamburg werden de eerste exemplaren in 1948 aangetroffen, evenals bij Hannover (*Bombus* 1 : 230, 231, 1953). Overigens zijn mij geen vermeldingen uit het buitenland bekend. Het eerste Nederlandse exemplaar dateert van 1954. Daarna is de vorm verschillende malen gevangen, steeds in het oosten en vooral het zuiden van het land, maar altijd in een enkel exemplaar. Wilp, 20.VII.1959 (TER LAAG); Gassel, 2.VIII.1957 (VAN DE POL); Geijsteren, 1964 (NEIJTS), 1965 (VERHAAK); Tegelen, 1.VIII.1961 (OTTENHEIJM); Swalmen, 9.V.1954 (LÜCKER); Maalbroek, 16.VII.1959 (LANDSMAN, in Mus. Rotterdam); Roggel, 1964 en Tegelen, 1966 (PEERDEMAN).

f. deleta Cockayne, 1951, *Ent. Rec.* 63 : 163. Op de bovenzijde van de voorvleugels ontbreken de dwarslijnen. Zulke zeer zwak getekende en meestal opvallend licht gekleurde exemplaren zag ik van Bennekom (VAN DE POL), Arnhem, De Bilt, Hilversum (Zoöl. Mus.), Den Dolder (CARON), Zeist (GORTER). Een normaal gekleurd exemplaar, maar eveneens zonder spoor van dwarslijnen, van Westervelde (Zoöl. Mus.).

f. protensa nov. De ronde vlek wortelwaarts uitgerekt tot de eerste dwarslijn. Putten, ♂, 2.VIII.1918 (holotype, Zoöl. Mus.).

[The orbicular lengthened in the direction of the base and touching the antemedian.]

f. juncta nov. Ronde vlek en niervlek raken elkaar. Arnhem, ♀, Naarden, ♂, 17.VII.1883 (holotype) (Zoöl. Mus.).

[The orbicular and the reniform touch each other.]

f. trilinea nov. Voor de tweede dwarslijn staat een volledige van costa naar binnenrand doorlopende donkere middenschaduw. Plaat 6 fig. 2. Vrij verbreed onder de soort. Holotype: ♂ van Eext, 11.V.1963 (Zoöl. Mus.).

[Before the postmedian is a complete dark central shade, extending from costa to inner margin of the fore wings. The form is not rare.]

Diloba Boisduval

Diloba caeruleocephala L. *Tijdschr. Entom.* 90 : 123; Cat. VIII : (533). Aan

de in 1949 gegeven verbreiding is weinig nieuw toe te voegen. De mate van voorkomen hangt uiteraard vooral af van de aanwezigheid van meidoorn en slee-doorn in een bepaald gebied. Het enige waddeneiland, waarvan de vlinder tot nu toe bekend is, is Terschelling. Enkele exemplaren van dit eiland bevinden zich in de kleine collectie van het Museum voor het Onderwijs te Den Haag, terwijl LEFFEF de rupsen in 1957 overal op meidoorn aantrof.

Geen correctie op de vliegtijd, die dus blijft: 30.VIII—8.XI.

Varia biliteit. f. infumata Schwingenschuss, 1918, *Verb. zool.-bot. Ges. Wien* 68: (150). Thorax, abdomen, voorvleugels en achtervleugels zwartbruin, de vlekken op de voorvleugels geel. Een min of meer verdonkerde vorm dus, maar dan met gele vlekken. Bij ons tot nog toe een rariteit. Halfweg, ♀, 1965 (VAN AARTSEN, in Zoöl. Mus.); Oostvoorne, ♂, 1960 (LUCAS).

f. medionigra van Wisselingh, 1966, *Ent. Ber.* 26: 183. Thorax en abdomen zwart, halskraag donker bruinachtig grijs; voorvleugels met zwart middenveld en normaal licht gekleurde vlekken, wortelveld en gewaterde band donker bruinachtig grijs, franjeveld zwartachtig; achtervleugels donker grijs. Plaat 6 fig. 3. Epen, ♂, 1.X.1965 (holotype, VAN WISSELINGH).

f. nigrescens nov. Voorvleugels egaal zwartachtig verdonkerd, de beide vlekken normaal, scherp afstekend; achtervleugels verdonkerd; lichaam zwart. Plaat 6 fig. 4. Eext, Amsterdamse Bos, Heemskerk (Zoöl. Mus.); Best (TER LAAG).

Holotype: ♂, Heemskerk, 9.X.1961, in collectie Zoöl. Mus.

[Fore wings of a uniform blackish tint, the two spots normal, sharply contrasting; hind wings darkened; body black.]

f. bipartita Strand, 1903. Exemplaren met volkomen gescheiden ronde vlek en niervlek komen vrij verbreid onder de soort voor.

f. orbimaculata Strand, 1903. Exemplaren met een derde vlek tussen de eerste dwarslijn en de beide andere vlekken is veel zeldzamer. Nieuwe vindplaatsen: Hoog-Keppel (Zoöl. Mus.); Groessen (VAN DE POL); Oostvoorne (LUCAS).

f. coalita Meves, 1914. De vorm, waarbij ronde vlek en niervlek samengesmolten zijn, maar waarbij de twee kernen nog afzonderlijk zichtbaar blijven, is gewoon en overal onder de soort aan te treffen.

f. confluens Dammer, 1922, *Ent. Z. Frankfurt* 35: 100 (*confluens* Bergmann, 1953, *Großschm. Mitteld.* 3: 452). Ronde en niervlek samengesmolten tot één vlek, waarin niet meer twee verschillende kernen te zien zijn. Plaat 6 fig. 5. Aerdenhout, 1948 (tegelijk *f. protensa*, VAN WISSELINGH).

f. protensa Lempke, 1949. De vorm met wortelwaarts uitgerekte ronde vlek (plaat 6 fig. 6) werd nog aangetroffen te: Hoog-Keppel (Zoöl. Mus.); Aerdenhout (VAN WISSELINGH).

f. trimaculata nov. De niervlek in tweeën gedeeld, waardoor drie kernen ontstaan, die even donker als de grondkleur zijn, met scherpe lichte ringen. Raalte, ♂, 19.X.1956 (holotype, FLINT).

[The reniform devided into two parts as a result of which there are three centres, as dark as the ground colour, each encircled by sharply contrasting pale rings.]

f. clausa Lempke, 1949. Nieuwe vindplaatsen van deze vrij zeldzame vorm zijn: Amsterdamse Bos (PEERDEMAN); Hendrik-Ido-Ambacht (BOGAARD).

Dwergen. Terschelling (Mus. Onderwijs Den Haag); Amsterdamse Bos (Zoöl. Mus.); Heerlerbaan (LUKKIEN).

PLUSIINAE

Syngrapha Hübner

Syngrapha interrogationis L. *Tijdschr. Entom.* 90 : 110; *Cat. VIII* : (520). Na de vangst van het eerste exemplaar in 1919 heeft het 35 jaar geduurd vòòr de vlinder weer in Nederland werd aangetroffen, maar sinds dat ogenblik (in 1955) werden we met verschillende vangsten van deze rariteit verrast. Dit meer buiten zijn normale areaal optreden is niet tot ons land beperkt gebleven. Ook in het omringende gebied zijn daarvan voorbeelden bekend geworden. HOFFMEYER vermeldt 1955 en 1959 als bieuonder goede jaren voor Denemarken (De Danske Ugler, 2de druk : 352, 1962). In hetzelfde jaar 1959 werd een exemplaar bij Hamburg gevangen (*Bombus* 2, supplement Heft 1 : 10, 1959). In het zuiden van Engeland (volkomen buiten het normale Britse biotoop dus) werd in 1955 een vlinder te Westcliff-on-Sea (Essex) gevangen, in 1959 weer één op dezelfde plaats en in 1964 een derde in Oost-Norfolk. Combineert men deze gegevens met die uit ons land (1959 het topjaar), dan blijkt er een duidelijke samenhang tussen te bestaan. Blijkbaar bestaat in een goed jaar voor de soort in noordelijker gebieden de kans bij ons, dat de vlinder ook hier is aan te treffen.

Alle vangsten stammen uit juli en augustus.

Vindplaatsen. Fr.: Terschelling, VII.1956 (LEFFEF, in Zoöl. Mus.). Ov.: Schalkhaar, 27.VII.1961 (OORD). Utr.: Zeist, 8.VIII.1959 (GORTER); Utrecht, 4.VIII.1959 (BERK); Amersfoort, 26.VII.1955 (prachtig exemplaar, NIEUWLAND). N.H.: Castricum, 12.VIII.1955 (BANK). Z.H.: Leiden, 1.VIII.1959 (KROON); Katwijk aan Zee, 31.VII.1959 (LUCAS); Oostvoorne, 1.VIII.1959 (VESTERGAARD).

Trichoplusia McDunnough

Trichoplusia ni Hübner. *Tijdschr. Entom.* 90 : 119; *Cat. VIII* : (529). Deze vlinder blijft wel een van de zeldzaamste immigranten voor onze fauna. Na de eerste vangst in 1931 is slechts één exemplaar binnen onze grenzen aangetroffen, namelijk in 1958, toen het een zeer goed vliegjaar voor de soort in het zuiden van Europa was. Ook uit het omringende gebied is weinig nieuws bekend geworden. Alleen in de nieuwe editie van „SOUTH“ worden een aantal Britse vangsten na 1931 opgesomd, waarbij 1952 en 1953 zelfs als goede jaren genoemd worden. De laatste melding daar is die van twee stuks in 1962 (in Surrey en Sussex).

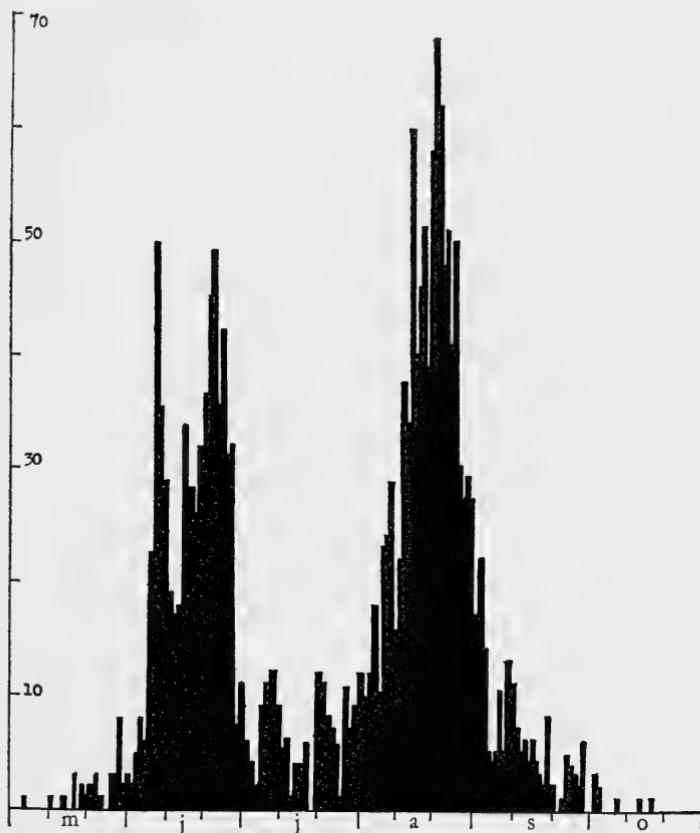
Vindplaats. Lbg.: Stein, 5.IX.1958 (collectie Missiehuis).

Autographa Hübner

Subgenus *Chrysaspidea* Hübner

Autographa (Chrysaspidea) festucae L. *Tijdschr. Entom.* 90 : 111; *Cat. VIII* : (521). Aan de reeds vrij lange lijst van vindplaatsen van *Cat. VIII* kan een zo

mogelijk nog langere toegevoegd worden, waaruit blijkt, dat de vlinder in ons land sterk verbreed is. Vooral het Hafdistrict is een ideaal gebied voor de soort, maar ook in het Fluviaziel District en trouwens ook op de hogere gronden, mits deze maar niet te droog zijn, kennen we tal van vindplaatsen. Op vochtige terreinen is de vlinder gewoon, maar hij is toch nooit zo talrijk als de volgende soort kan zijn. Van de waddeneilanden is behalve Terschelling en Texel nu ook Vlieland als vindplaats bekend geworden.



van de tweede generatie zijn, maar het is niet uitgesloten, dat er een snel ontwikkeld exemplaar bij is, dat dan tot een (zeer partiële) derde generatie zou behoren. DE ROO VAN WESTMAAS schrijft in „Sepp”, 2de serie 1 : 53 (\pm 1858), dat SNELLEN in september 1857 rupsen vond op mannagrass (*Glyceria fluitans* R. Br.), waarvan de vlinders 1 oktober uitkwamen. Deze rupsen kunnen heel goed afkomstig geweest zijn van vroege vlinders van de tweede generatie, zodat de vlinders dan derde generatie-dieren waren.

Vindplaatsen. Fr.: (van het reeds vermelde eiland Terschelling schrijft LEFFEF me: „In de Kooibosjes, te Westterschelling en Hoorn vrij gewoon”), Vlieland, Sexbierum, Akkrum, Eernewoude, Oltterp, Wijnjeterp, Oosterwolde, Fochtelo, Noordwolde, Nijetrijne, Oudemirdum, Rijs, Hemelum, Hieslum, Tjerkwerd. Gr.: Haren, Glimmen, Noordlaren, Borgercompagnie, Veendam. Dr.: Paterswolde, Eelde, Peize, Roden, Steenbergen, Een, Norg, Veenhuizen, Donderen, Zuidlaren, Annen, Eext, Schoonlo, Havelte. Ov.: Volthe, Rectum, Beerse, Den Ham, Ommen, Rechteren, Dalfsen, Raalte, Abdij Sion, Slagharen, Deventer, Zwolle, IJsselmuiden, Zwartsluis, Vollenhove, Marknesse. Flevoland: Lelystad. Gdl.: Hoophuizen, Ermelo, Vierhouten, Wezep, Vaassen, Wiessel, Hoog-Soeren, Teuge, Empe, Laag-Soeren, Rozendaal, Otterlo, Kootwijkerveen, Wageningen, Bennekom, Lunteren; Gorssel, Eefde, Warnsveld, Zutphen, Almen, Winterswijk, Hoog-Keppel, Didam, Aerdt, Groessen; Ochten, Ingen, Buren, Geldermalsen, Slijk-Ewijk. Utr.: Cothen, IJsselstein, Harmelen, Bilt-hoven, Den Dolder, Spakenburg, Vinkeveen, Botshol. N.H.: 's-Graveland, Blaricum, Kortenhoef, Ankeveen, Naarden, Naardermeer, Weesp, Uithoorn, Amsterdamse Bos, Halfweg, Zaandam, Westzaan, Wormerveer, Beemster, Oosthuizen, De Koog, Groet, Catrijp, Schoorl, Bergen, Overveen, Haarlem. Z.H.: Woerdense Verlaat, Noorden, Nieuwkoop, Reeuwijk, Meijendel, Voorschoten, Leidschendam, Rijswijk, Delft, Staelduin, Maassluis, Capelle aan den IJssel, Krimpen aan den IJssel, Vianen, Arkel, Spijk, Gorkum, Schelluinen, Ottoland, Sliedrecht, Hendrik-Ido-Ambacht, Rhoon, Barendrecht, Oostvoorne, Rockanje, Hellevoetsluis, Middelharnis, Melissant, Ouddorp. Zl.: Haamstede, Burgh, Westenschouwen, Oostkapelle. N.B.: Bergen op Zoom, Dorst, Lage Zwaluwe, Waalwijk, Sint Michielsgestel, Haaren, Kampina, Vessem, Bergeijk, Eindhoven, Nederwetten, Geldrop, Helenaveen, Uden, Gassel. Lbg.: Geijsteren, Sevenum, Roggel, De Hamert, Grubbenvorst, Velden, Blerick, Tegelen, Maalbroek, Sint Odiliënberg, Vlodrop, Herkenbosch, Montfort, Stein, Nuth, Amstenrade, Brunssum, Schinveld, Bunde, Maastricht, Gronsveld, Epen, Cottessen, Vijlen, Vaals.

Variabiliteit. f. *coalescens* Schultz, 1905. De vorm, waarbij de twee discale zilvervlekken op de voorvleugels met elkaar verbonden zijn (wat kan variëren van raken tot geheel samengesmolten) komt in klein percentage vrijwel overal onder de soort voor, zodat geen vindplaatsen meer genoemd worden.

f. *parvomaculata* nov. De buitenste discale zilvervlek op de bovenzijde van de voorvleugels is sterk verkleind. Stein, ♂, 22.VII.1959 (holotype, collectie Missiehuis).

[The outermost discal silver spot on the upper side of the fore wings is very small.]

f. *obscura* nov. Grondkleur van de voorvleugels sterk verdonkerd, donker bruinachtig, de grootste discale vlek dikwijls donker gekernd; achtervleugels grijszwart. Plaat 6 fig. 7. Niet al te zeldzaam, althans onder het moderne materiaal. Nijetrijne, Borgercompagnie, Lelystad, Apeldoorn, Halfweg, Woerdense Verlaat, Hellevoetsluis (Zoöl. Mus.); Groessen (VAN DE POL); Bussum (TER LAAG); Zaandam (AUKEMA); Bergeijk (VAN WISSELINGH).

Holotype: ♀ van Halfweg, 23.VI.1962, in collectie Zoöl. Mus.

[Ground colour of the fore wings strongly darkened, dark brownish, the larger discal spot often with dark centre; hind wings grey-black.]

f. alepica nov. Achtervleugels op een smalle baan langs de achterrand na geheel onbeschubd. Plaat 6 fig. 8. Halfweg, ♂, 8.VIII.1959 (holotype, VAN AARTSEN leg., Zoöl. Mus.).

[Hind wings without scales with the exception of a narrow band along the outer margin.]

Dwergen, Veenhuizen (Zoöl. Mus.); Twello, Zwammerdam (Zoöl. Mus.); Deventer (LUKKIEN); Amsterdam (PEERDEMAN); Nuenen (NEIJTS); Blerick, Swalmen (OTTENHEIJM); Sint Odiliënberg, Montfort (MAASSEN).

Autographa (Chrysaspidea) gracilis Lempke. Zie voor de beschrijving van deze soort *Ent. Ber.* 26: 64—71, plaat 1 (1966). Hoewel de verspreiding ervan



Fig. 47. De nu bekende verspreiding van *Autographa gracilis* Lempke in Nederland

nog slechts gedeeltelijk bekend is, is het toch reeds duidelijk, dat het ideale biotoop voor de vlinder gevormd wordt door niet te kleine moerassige terreinen. Vooral de vangsten met de RIVON-vallen door LEFFEF en G. DIJKSTRA in zulke vroeger nooit goed doorzochte gebieden hebben hiervoor belangrijke gegevens geleverd. Op de goede vliegplaatsen blijkt het dier in de regel zijn verwant *A. festucae* in aantal duidelijk te overtreffen.

Uit de hierbij gegeven verspreidingskaart (fig. 47) is reeds goed te zien, dat de vlinder niet tot een klein deel van ons land beperkt is, zodat we in de toekomst ongetwijfeld nog meldingen van nieuwe vindplaatsen kunnen verwachten. Opvallend is het aantal vondsten in het noorden van Drente. Maar ook in Friesland zal de soort wel veel verbreider zijn dan we nu weten. Hetzelfde zal waarschijnlijk het geval zijn in het Hollands-Utrechtse deel van het Hafdistrict.

Over het voorkomen van de soort in Denemarken verscheen intussen een artikel van F. NAABYE, *Plusia* tvillinger *P. festucae* Linn. og *P. gracilis* Lmk., in *Flora og Fauna* 72 : 79—83, fig. 1—4 (1966).

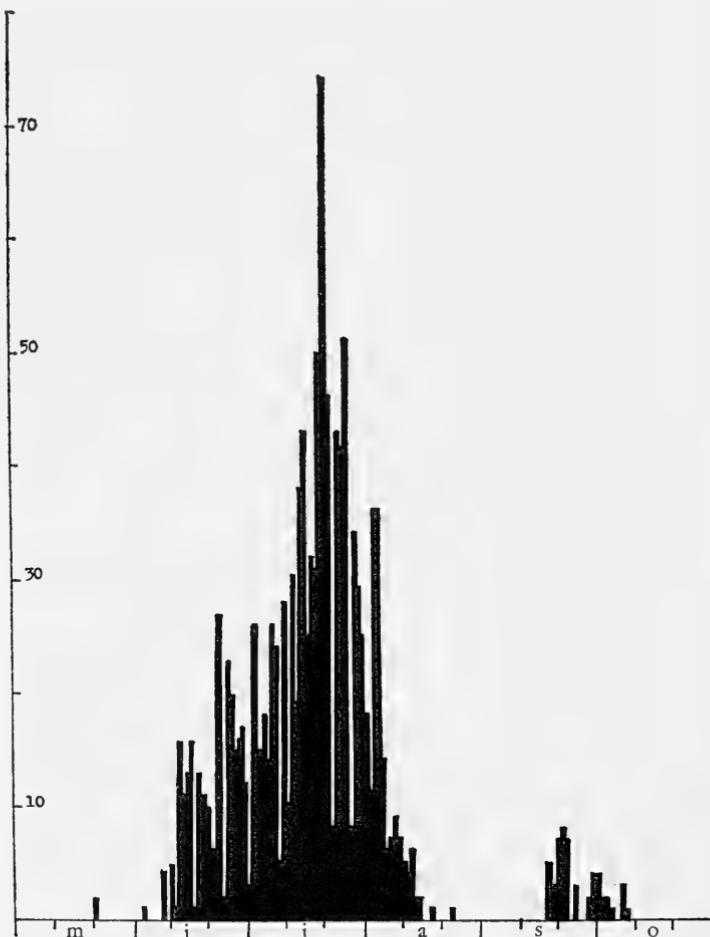


Fig. 48. Histogram van *Autographa gracilis* Lempke.

(The histogram is mainly composed from the data of 1964 and 1965. Cf. fig. 46!)

Vergelijkt men het hierbij gegeven histogram (fig. 48) met dat van *A. festucae* (fig. 46), dan blijkt een duidelijk verschil tussen het voorkomen van de beide generaties te bestaan. Terwijl bij *festucae* de top in de tweede generatie valt, is bij *gracilis* de eerste generatie het talrijkst. Bovendien is deze generatie veel talrijker dan die van *festucae* en vliegt veel langer. Hierbij moet men wel bedenken, dat we voor *gracilis* slechts over de gegevens van een paar seizoenen beschikken. Zouden de waarnemingen over een reeks van jaren voortgezet worden, dan zouden de verschillen ongetwijfeld nog groter zijn.

De eerste generatie vliegt van de tweede helft van mei tot de tweede helft van augustus (21.V—23.VIII). Vangsten van mei en de eerste decade van juni zijn echter uitzonderingen. Pas in de tweede helft van juni begint de vlinder goed te vliegen om in juli zijn hoogtepunt te bereiken. In de tweede helft van augustus vliegen nog slechts volkomen afgevlogen dieren.

De veel schaarsere tweede generatie vliegt van half september tot begin oktober (17.IX—6.X). Of hij elk jaar voorkomt, is niet zeker. In het ongunstige seizoen 1965 werd er in elk geval geen enkel exemplaar van gevangen.

Vindplaatsen. Fr.: Eernewoude (Princenhof, Oude Venen), Wijnjeterp (talrijk), Nijetrijne (talrijk). Gr.: Glimmen. Dr.: Een, Westervelde, Veenhuizen, Norg, Donderen, Bunnerveneen, Eext, Wijster. Ov.: Lemelerveld. Gdl.: Empe; Hatert. Utr.: Botshol. N.H.: Ankeveen, Bussum, Naardermeer. Z.H.: Woerdense Verlaat, Noorden, Asperen, Hellevoetsluis. N.B.: Eindhoven, Nuenen, Helenaveen. Lbg.: Griedsveen (talrijk), Sevenum, Weert, Moesel, Maalbroek, Bunde.

Variabiliteit. De grondkleur van de voorvleugels varieert nogal in tint. Soms zijn de vleugels prachtig rood van kleur, dan weer is het rood sterk gereduceerd en overheerst een meer gele tint. Deze uitersten zijn echter door allerlei nuances zo met elkaar verbonden, dat het onmogelijk is er duidelijk omgrensde kleurgroepen in te onderscheiden. De enige goed omschrijfbare vorm is weer een donkere, die vrijwel geheel overeenstemt met de donkere vorm van *festucae*.

f. obscura nov. Voorvleugels donkerbruin zonder enige rode tint, achtervleugels grijswart. Wijnjeterp (het Schar), ♂, 26/27.VII.1965 (holotype), Nijetrijne (Zoöl. Mus.).

[Fore wings dark brown without any reddish tint, hind wings grey-black.]

f. coalescens nov. Bovenzijde voorvleugels: de twee discale zilvervlekken met elkaar verbonden, net als bij *festucae* variërend van elkaar rakend tot geheel samengesmolten. Plaat 6 fig. 9. In klein percentage vrijwel overal onder de soort voorkomend, daar de vorm in elke niet te kleine serie aanwezig is.

Holotype: ♂ van Nijetrijne, 30.VII.1964, in collectie Zoöl. Mus.

[Upper side fore wings: the two discal silver spots united, varying from just touching to completely coalescing.]

f. disconulla nov. Bovenzijde voorvleugels: de twee discale zilvervlekken ontbreken geheel. Plaat 6 fig. 10. Ongetwijfeld een zeer zeldzame mogelijk recessieve vorm. Griedsveen, ♂, 21.V.1964 (holotype, LEFFEF, in Zoöl. Mus.).

[Upper side fore wings: the two discal spots fail completely.]

Autographa (Chrysaspidia) bractea Schiff. Deze fraaie immigrant (afgebeeld op plaat 6 fig. 11) werd voor het eerst in 1954 in het zuiden van ons land waargenomen. Daarna zijn nog een viertal vangsten bekend geworden. In Denemarken werd de vlinder voor het eerst in 1962 aangetroffen (zeven stuks op Bornholm, zie KAABER & NORGAARD, 1963, *Flora og Fauna* 69 : 109). In het noordwesten van Duitsland werd in 1952 een exemplaar bij Harburg gevangen (*Bombus* 1 : 314, 1952). In België werd de eerste *bractea* in 1940 te Loën verzameld, gevolgd door vangsten te Losheimergraben (in het oosten van Luik) in 1959, te Uccle (Brussel) in 1962 en in 1963 te Buzenol (in het zuiden van de provincie Luxemburg). Op de Britse eilanden is de vlinder inheems. Hij is sterk verbreid en gewoon in Ierland, verbreid in Schotland en het noorden van Engeland, maar ook aangetroffen in het zuiden van Wales en ten noorden van Bristol. Bovendien in 1956 in de omgeving van Londen (zwerver of trekker).

(In Frankrijk komt de vlinder voor in het hoge oostelijke gedeelte, van de Basses-Alpes tot in de Vogezen — zie LHOMME, Cat. Lép. de France et de Belgique : 319 —, zodat het met het oog op de Nederlandse en Belgische vindplaatsen toch wel het meest voor de hand liggend is, dat onze immigranten vanuit zuidelijke richting naar ons land komen. Toch zit in de Britse populaties ook wel enige beweging blijkens de vangst van een exemplaar in de naaste omgeving van Londen, zodat we een overvliegen vanuit het noorden van Engeland of Schotland niet geheel kunnen uitsluiten.)

Vindplaatsen. Z.H.: Hendrik-Ido-Ambacht, 3.VII.1959 (tweede Nederlandse exemplaar, BOGAARD); Oostvoorne, 26.VII.1964 (VAN DER MADE c.s.). N.B.: Helenaveen, 2.VII. 1963 (LEFFEF, afgebeeld). Lbg.: Gulpen, 3.VII.1963 (F. J. VAN OOSTERHOUT); Epen, 18.VIII.1954 (eerste vangst in Nederland, VAN WISSELINGH).

Subgenus *Autographa* Hübner

Autographa (Autographa) iota L. *Tijdschr. Entom.* 90 : 114; Cat. VIII : (524). Hoewel enkele vindplaatsen in het Hafdistrict en het Fluviaal District bekend geworden zijn, is de verspreiding in ons land toch wel in grote trekken, zoals die in 1949 werd aangegeven. In het Waddendistrict is de vlinder nu van een van de eilanden bekend.

Er is geen correctie op de vliegtijd.

Vindplaatsen. Fr.: Terschelling (gewoon, LEFFEF), Leeuwarden, Beetsterzwaag, Duurswoude, Wijnjeterp (gewoon, G. DIJKSTRA), Oosterwolde, Nijetrijne, Oudemirdum, Nijemirdum. Gr.: Groningen, Haren, Noordlaren. Dr.: Peize, Roden, Steenbergen, Norg, Westervelde, Donderen, Vries, Zuidlaren, Eext, Schoonlo. Ov.: Volthe, Saasveld (Molenven), Rechteren, Dalfsen, Ommen, Raalte, Diepenveen, Abdij Sion, Frieswijk, Deventer, Kalenberg. Gdl.: Garderbroek, Putten, Vierhouten, Nunspeet, Tongeren, Epe, Wenum, Wiessel, Teuge, Empe, Laag-Soeren, Wageningen, Bennekom, Ede, Lunteren; Gorssel, Eefde, de Voorst, Ruurlo, Ratum, Winterswijk, Woold, Hoog-Keppel, Babberich, Loerbeek; Ubbergen, Geldermalsen, Neerijnen. Utr.: Botshol. N.H.: 's-Graveland, Blaricum, Huizen, Bussum, Naardermeer, Muiderberg, Weesp, Amsterdamse Bos (één exemplaar in 1957), Zaandam, Schoorl, Bergen, Heemskerk, Aerdenhout. Z.H.: Meijendel, Staelduin, Oostvoorne, Rockanje, Nieuw-Helvoet, Hellevoetsluis, Melissant, Ouddorp. Zl.: Haamstede, Burgh, Westenschouwen, Oostkapelle. N.B.: Strijbeek, Dorst, Drunen, Nieuwkuik, Sint Michielsgestel, Haaren, Oisterwijk, Boxtel, Best, Nederwetten, Nuenen, Eindhoven, Valkenswaard, Velp bij Grave. Lbg.:

Geijsteren, Sevenum, Griendsveld, Moesel, Roggel, de Hamert, Venlo, Tegelen, Belfeld, Swalmen, Maalbroek, Sint Odiliënberg, Meijnweg, Montfort, Wijnandsrade, Brunssum, Bocholtz, Geulem, Bunde, Gronsveld, Vijlen, Lemiers, Vaals.

Variabiliteit. f. *baltica* Speyer, 1875. Deze donkere vorm werd nog bekend van: Eelde, Apeldoorn (Zoöl. Mus.); Wiessel, Vierhouten, Meijendel (LUCAS); Aalten (VAN GALEN); Stein (Missiehuis).

f. *percontationis* Treitschke, 1826. De vorm met verbonden zilvervlekken is inderdaad zeldzaam, maar is toch zeer verbreid onder de soort blijkens de vele nieuwe vindplaatsen, die ervan genoteerd konden worden. Een opsomming daarvan blijft dan ook achterwege.

f. *incipiens* Lempke, 1949. Hetzelfde geldt voor de vorm, waarbij de droppel ontbreekt.

f. *inscripta* Esper, [1788]. Exemplaren zonder spoor van de zilvertekening zijn zeldzaam. Epe (KAIJADOE); Wageningen, Bennekom (VAN DE POL); Ratum (PEERDEMAN); Nederwetten, Eindhoven (VAN DER WOLF); Swalmen (LÜCKER). Bij overgangen naar deze vorm zijn nog min of meer duidelijke resten van de droppel aanwezig: Oosterwolde (VAN RANDEN); Aerdenhout (VAN WISSELINGH).

Dwerg. Swalmen (LÜCKER).

Autographa (Autographa) pulchrina Haworth. *Tijdschr. Entom.* 90 : 114; Cat. VIII : (524). Veel minder verbreid dan de vorige soort. Het meest voorkomend in het Duindistrict, hoewel de vlinder ook hier op de vliegplaatsen lang niet ieder jaar even gewoon is. Daarnaast min of meer lokaal op de zandgronden van het binnenland en in het Krijtdistrict. Opvallend zijn vooral de vindplaatsen in het westelijk deel van het Fluviaal District en in het Hafdistrict. In het Wadden-district nu van één van de eilanden bekend.

De vliegtijd kan tot in de tweede helft van juni duren. De uiterste data zijn nu: 14.V—22.VII.

Vindplaatsen. Fr.: Terschelling (weinig, LEFFEF), Wijnjeterp, Nijetrijne, Oudemirdum (in 1964 opvallend gewoon, LEFFEF). Dr.: Schoonlo. Ov.: Colmschate. Gdl.: Wiessel, Hoog-Soeren, Empe, Laag-Soeren, Lunteren; Hoog-Keppel. Utr.: Amersfoort, Zeist. N.H.: Amsterdamse Bos (weinig, maar geregeld, PEERDEMAN), Schoorl, Heemskerk, Aerdenhout (in 1952 gewoon, VAN WISSELINGH), Vogelenzang, Heemstede. Z.H.: Oegstgeest, Meijendel, Arkel, Schelluinen, Hendrik-Ido-Ambacht, Oostvoorne, Hellevoetsluis, Ouddorp. Zl.: Haamstede, Burgh, Westenschouwen, Oostkapelle. N.B.: Dorst, Boxtel, Best, Eindhoven. Lbg.: Sevenum, Griendsveld, Meijnweg, Stein, Brunssum, Aalbeek, Geulem, Maastricht, Gronsveld, Epen, Vijlen, Vaals.

Variabiliteit. f. *gammoides* Speyer, 1875. De vorm met violetgrijze grondkleur werd nog bekend van Aerdenhout (gewoon), Vogelenzang (VAN WISSELINGH); Heemstede, Eijs (VAN DE POL); Vijlen (Zoöl. Mus.); Vaals (LUKKIEN).

f. *derosea* van Wisselingh, 1954, *Ent. Ber.* 15 : 19. Grondkleur van de voorvleugels grijsbruin, zonder spoor van rood of violet. Aerdenhout (VAN WISSELINGH).

f. *percontatrix* Aurivillius, 1888—1891. De vorm met verbonden zilvervlekken werd nog gevangen te: Heemskerk (DE BOER); Aerdenhout, Epen (VAN WISSE-

LINGH); Heemstede (VAN DE POL); Arkel (ZWAKHALS); Schelluinen (SLOB). Een overgang met bijna verbonden vlekken van Leiden (LUCAS).

f. *incipiens* Schawerda, 1929. De vorm met ontbrekende droppel is veel zeldzamer. Nieuwe vindplaatsen: Aerdenhout (VAN WISSELINGH, één exemplaar in een serie van bijna 100!); Heemstede (VAN DE POL); Arkel (ZWAKHALS).

f. *circumscripta* nov. De v-vormige zilvervlek is van boven gesloten. Aerdenhout, 17.V.1952, ♂, holotype (VAN WISSELINGH).

[The v-shaped silver spot is closed on its upper side.]

f. *obsoleta* nov. De tekening van de vlekken op de bovenzijde van de voorvleugels is wel aanwezig, maar mist de zilverkleur, zodat hij slechts zwak zichtbaar is. Vaals, ♂, 5.VI.1964, e. l., holotype (LUKKIEN).

[The spots on the upper side of the fore wings are present, but without the silver colour, so being only feebly visible.]

Dwerg. Gronsveld (Zoöl. Mus.).

Autographa (Autographa) gamma L. *Tijdschr. Entom.* 90 : 116; Cat. VIII : (526). Aan de verbreiding is slechts toe te voegen, dat de vlinder nu ook van Vlieland bekend is, zodat alleen Rottum nog in de rij der waddeneilanden ontbreekt.

In de regel komen de eerste immigranten in de loop van april. Toch zijn een enkele maal reeds in maart gamma-uilen waargenomen (1961, 1964, 1965). Dit waren dieren, die buiten in de vrije natuur werden aangetroffen als de eerste voorlopers van hun later opdagende soortgenoten. In dit opzicht van minder belang is een vlinder, die 24 maart 1960 in een kas te Aalsmeer werd gevangen, al is het een aanwijzing, welke mogelijkheid er ook soms voor het dier is om zich in ons klimaat te ontwikkelen. Hoe het verder met de soort in de loop van het jaar zal gaan, hangt in sterke mate van het seizoen af. In de regel is het wel zo, dat de grote top in het begin van de herfst valt (september, begin oktober). In sommige jaren zijn duidelijk twee toppen te onderscheiden, ook een in de loop van juli en augustus. Meestal gaat het aantal exemplaren in de eerste helft van oktober (maar niet zelden ook al vroeger) in zeer korte tijd heel snel achteruit, wat vermoedelijk toegeschreven moet worden aan een terugtrek naar het zuiden, die dan vrij plotseling plaats vindt. Achterblijvers kunnen evenwel nog tot ver in november aangetroffen worden. Zelfs in december blijken bij gunstig weer sporadisch nog dieren actief te zijn, zoals in 1948. Te beginnen met 1952 zijn ze elk jaar waargenomen met uitzondering van 1958, 1963 en 1965. Hierop sluiten dan een paar meldingen van januari-exemplaren aan (15 en 22.I.1957, Den Haag; 10.I.1960, Castricum). Waarnemingen uit februari zijn echter nog niet bekend. Dit wijst er op, dat de kans voor een imago om hier de winter door te komen, in elk geval uitermate klein is.

Wel gelukt dit een enkele maal aan rupsen, niet alleen in het gunstige microklimaat van kassen (hoewel hier natuurlijk veel gespoten wordt) en bakken, maar ook buiten in de vrije natuur, waar sommige ervan in staat blijken te zijn behoorlijk lage temperaturen (10 of meer graden vorst) te doorstaan (1950, 1952, 1964,

1965). Verse vlinders, die hier in mei of juni vliegen, kunnen van zulke rupsen afstammen, maar het is even goed mogelijk, dat het pas ontwikkelde exemplaren uit het subtropische Middellandse Zee-gebied zijn.

Variabiliteit. De grondkleur van de voorvleugels varieert sterk. Soms is de achterrond zeer licht en is de grondkleur zelf van een koude donkere, soms zelfs zwartachtig grijze tint (een mooie kleurvorm overigens), dan weer is de grondkleur meer met bruin of roodachtig gemengd.

f. pallida Tutt, 1892. Alle lichtere delen van de voorvleugels (wortel, voorrand, achterrond) lichtgrijs. Plaat 7 fig. 2. Onder al onze generaties voorkomend en waarschijnlijk niet al te zeldzaam (in Zoöl. Mus. exemplaren van Westervelde, Wiessel, Apeldoorn, Nijmegen, Den Haag en Boxtel).

[From TUTT's text (Brit. Noct. 4 : 32, 1892) one gets the impression that he had not actually seen specimens answering to the description, but that he only gave a name to GUENÉE's "Var. A", the description of which (literally translated by TUTT) is rather misleading. For the French author refers to ESPER, Schmetterl. in Abb. 4, 1, pl. 111 fig. 2 (cf. Noctuélites 2 : 349, 1852). ESPER's figure 1 is a specimen with very dark fore wings, whereas fig. 2, which he calls "Eine Abänderung des Weibchens" has the head, thorax and all the pale parts of the fore wings (basal, costal and outer areas) of a pale grey colour (in the specimen figured with a slightly rosy tint, but this must be extremely rare). The form occurs in all Dutch generations and is not rare. A good specimen is figured on plate 7 fig. 2, with a typical specimen for comparison.]

f. alba Cockayne, 1951, Ent. Rec. 63 : 164 (*effusa* van Wisselingh, 1959, Ent. Ber. 19 : 197). Grondkleur van de voorvleugels witachtig, de tekening licht grijachtig. Plaat 7 fig. 3. Epen, ♂, 2.IX.1958 (VAN WISSELINGH).

(Van deze uiterst zeldzame vorm kende COCKAYNE één exemplaar uit Engeland. Bovendien verwijst hij naar CULOT, Noct. et Géom., plaat 71 fig. 17. Het daar afgebeelde exemplaar uit Silezië komt volkomen met het Nederlandse overeen).

f. rufescens Tutt, 1892. De diagnose, die in Cat. VIII gegeven werd, is niet juist. De naam moet gebruikt worden voor exemplaren met opvallend roodachtige voorvleugels. Deze vorm is niet gewoon. In Zoöl. Mus. exemplaren van Putten, Halfweg en Valkenburg.

f. brunnea nov. Grondkleur van de voorvleugels zuiver bruin, overigens normaal. Kollum, Arnhem, Hilversum (♂, 7.VIII.1879, holotype), Wijk aan Zee (Zoöl. Mus.); Hendrik-Ido-Ambacht, 1959 (BOGAARD).

[Ground colour of the fore wings pure brown, for the rest normal.]

f. lilacina Lempke, 1949. Het holotype bevindt zich thans in de collectie van het Zoöl. Mus. Andere exemplaren zijn niet bekend.

f. fuscescens Goodson, 1966, Ent. Rec. 78 : 152, pl. VI fig. 4. Voor- en achtervleugels overdekt door een donker bruinachtige tint, waardoor ze veel eenkleuriger zijn; het gamma-teken bruinachtig goudkleurig, nog duidelijk, maar veel minder afstekend. Zie plaat 7 fig. 4. Apeldoorn, ♂, 20.IX.1953 (LUCAS).

f. nigricans Spuler, 1907. Exemplaren met zeer donkere, haast zwartachtige voorvleugels blijken niet zulke grote zeldzaamheden te zijn. Een prachtig exemplaar uit de collectie-LUCAS is afgebeeld op plaat 7 fig. 5. Apeldoorn, Halfweg (Zoöl. Mus.); Slijk-Ewijk, Heemstede (VAN DE POL); Rheden (VON HERWARTH); Amersfoort (NIEUWLAND); Zeist (GORTER); Middelie (DE BOER); Castricum

(BANK); Hendrik-Ido-Ambacht (BOGAARD, LUCAS); Oostvoorne (LUCAS); Sint Michielsgestel (KNIPPENBERG); Bergeijk (VAN WISSELINGH); Mechelen (PEERDEMAN).

f. *postfusca* nov. De wortelhelft van de achtervleugels sterk verdonkerd, niet scherp gescheiden van de donkere achterrand; voorvleugels normaal. Nes op Ameland, ♀, VIII.1938 (holotype, Zoöl. Mus.).

[The basal half of the hind wings strongly darkened, not sharply separated from the dark band along the outer margin; fore wings normal.]

f. *microgamma* nov. Voorvleugels met normaal gevormde maar sterk verkleinde gamma-vlek. Plaat 7 fig. 6. Marknesse, ♂, 21.VI.1951 (holotype), Buren, ♀, 21.VI.1962 (VAN DE POL).

[The gamma spot on the fore wings has the normal shape, but it is strongly reduced in size.]

f. *comma* Ostrejkówna, 1929. De vorm, waarbij de gamma gereduceerd is tot een tamelijk dik gebogen staafje, werd nog aangetroffen te: Harderwijk (A. VAN BEEK); Apeldoorn, Amsterdam (Zoöl. Mus.); Heemskerk (BANK); Melissant (HUISMAN); Stein (Missiehuis).

f. *bipartita* Orstadius, 1929. Nieuwe vindplaatsen van de vorm met doorgebroken gamma zijn: Grollo (LEFFEF); Apeldoorn (LEFFEF, vier exemplaren, in Zoöl. Mus.); Doorn (VAN DER WOLF); Amersfoort (NIEUWLAND); Zeist (GORTER); Hendrik-Ido-Ambacht (BOGAARD); Melissant (HUISMAN); Geldrop (HAANSTRA); Stein (Missiehuis).

f. *tiltscheri* Diószeghy, 1935. De vorm met ontbrekende droppel werd gevangen te: Apeldoorn, Amsterdam (Zoöl. Mus.); Gorssel (S. R. DIJKSTRA); Weesp (WESTERNENG); Oegstgeest (KAIJADÖE); Oostvoorne (VESTERGAARD); Melissant (HUISMAN); Nuenen (NEIJTS); Stein (Missiehuis).

f. *incipiens* Cockayne, 1955, *Entomologist* 88 : 75, pl. III fig. 8. Alleen de droppel is nog van de zilvervlek over. Zutphen (S. R. DIJKSTRA); Melissant (HUISMAN).

f. *inscripta* van de Pol, 1963, *Ent. Ber.* 23 : 63, fig. De gamma-tekening ontbreekt geheel. Heemstede, ♂, 1954 (VAN DE POL).

Teratologische exemplaren. Rechter achtervleugel te klein. Bennekom, Slijk-Ewijk (VAN DE POL).

Rechter voorvleugel te klein. Heemstede (VAN DE POL).

Beide rechter vleugels te klein. Bennekom (VAN DE POL).

Pathologisch exemplaar. Achtervleugels gedeeltelijk verbleekt. Valkenburg (STAMMESHaus).

Macdunnoughia Kostrowicki¹⁾

Macdunnoughia confusa Stephens. *Tijdschr. Entom.* 90 : 119; Cat. VIII : (529). Na de eerste vangsten hier te lande in 1934 en 1945 werd de vlinder weer

¹⁾ *Parapplusia* Mukerji & Krishnamorthy, 1955, *Proc. 42nd Indian Sci. Congr.* 3 : 295. Type species: *P. confusa* Stephens. The name is nine years older than the one introduced by KOSTROWICKI, but as far as I could ascertain it was never accompanied by a valid description, so that it remains a nomen nudum.

in 1949 aangetroffen en te beginnen met dat jaar werd hij een vrij geregelde, hoewel over het algemeen zeldzame, verschijning. Alleen in de jaren 1957, 1958 en 1962 werden geen meldingen over het voorkomen in Nederland ontvangen. Een echte migrant is *confusa* niet. Hij behoort tot de soorten, die de laatste decenniën hun areaal uitgebreid hebben. Of het hem echter duurzaam zal gelukken hier vaste voet te krijgen, moeten we afwachten. Er zijn verschillende tekenen, dat *confusa* zich hier maar met moeite kan handhaven: de zeer kleine eerste generatie, die in vele jaren, dat de zomergeneratie wel aanwezig is, zelfs niet eens wordt waargenomen, de meestal zeer kleine jaartotalen, de hiaten in de jaren van voorkomen of in elk geval van waargenomen worden. Ook in de ons omringende gebieden is de vlinder nergens een gewone soort geworden, integendeel, Nederland slaat tot nog toe het beste figuur (wat voor een deel ook kan liggen aan het aantal en het enthousiasme van de waarnemers).

Wat de Nederlandse vindplaatsen betreft, op Groningen en Drente na is de vlinder in alle provincies aangetroffen. Maar de meeste vondsten stammen uit Limburg. Nieuwe gegevens uit de omringende gebieden zijn de volgende. In Denemarken werd in 1949 een exemplaar te Randers gevangen en in 1950 een tweede te Aabenraa (beide in Jutland). In de omgeving van Hamburg werd *confusa* bijna alle jaren van 1948 tot 1954 waargenomen, bij Hannover in 1948, in de voormalige Rijnprovincie in 1953 en 1954 bij Rheindt (KÜNNERT, Ent. Z. Frankfurt 67 : 152, 1957). Uit België zijn alleen vangsten gemeld van Grandmenil en Argenteau (beide in de provincie Luxemburg) (*Lambillionea* 57 : 47, 1957; 63 : 22, 1964). Maar onze Limburgse ervaringen wijzen er duidelijk op, dat de vlinder bij onze zuidelijke buren althans in het oosten van hun land meer te vinden moet zijn. In Groot-Brittannië is *confusa* een paar maal in het zuiden van Engeland waargenomen: in 1951 in Essex, in 1955 in Norfolk, Kent en Surrey en in 1962 in Devon. Vaste voet heeft de soort hier blijkbaar niet gekregen.

De gunstigste periode was bij ons het tijdvak 1950—1955 (maximum in 1955 met 31 stuks), waarmee de ervaringen om ons heen over het algemeen dus vrij goed overeenstemmen.



Fig. 49. Histogram van *Macdunnoughia confusa* Stephens.
(Composed from the data of 176 specimens).

De vlinder is bij ons waargenomen tussen 14 mei (1954, Eindhoven, VAN DULM) en 30 oktober (1951, Swalmen). In het histogram (fig. 49) zijn de gegevens verwerkt van alle 176 Nederlandse exemplaren, waarvan de juiste datum bekend is. Vangsten in de tweede helft van mei en de eerste helft van juni komen sporadisch voor. Tussen 10.VI en 4.VII is slechts één enkele waarneming bekend. Pas de tweede helft van juli is wat beter voor de soort. Deze gunstige periode kan voortduren tot omstreeks 20.VIII. Een tweede periode valt in de tweede helft van september en houdt nog aan in oktober. Het lijkt er dus op, dat er in een gunstig

seizoen drie generaties kunnen voorkomen, de eerste tussen half mei en half juli, de tweede van half juli tot begin september en de derde van half september tot eind oktober en mogelijk zelfs begin november (nog vijf stuks op 30.X!). Elk seizoen is echter weer anders en onze gegevens zijn nog te klein om een definitief oordeel mogelijk te maken. Bovendien weten we nog niets van de biologie van de soort in ons klimaat.

Een Nederlands exemplaar is afgebeeld op plaat 6 fig. 12.

Vindplaatsen. Fr.: Sexbierum (1964), Nijetrijne (1964). Ov.: Burense (1952), Olst (1954). Gdl.: Wageningen (1953, 1954, 1955, 1960); Warnsveld (1950), Aalten (1950, 1951, 1956); Malden (1960). Utr.: Amerongen (1958), Zeist (1953, 1955, 1959, 1960, 1961), Amersfoort (1953). N.H.: Hilversum (1955), Blaricum (1955). Z.H.: Arkel (1960). ZL.: Oostkapelle (1956). N.B.: Boxtel (1965), Eindhoven (1953, 1954, 1955), Helenaveen (1963). Lbg.: Horst (1954), Sevenum (1954, 1955), Grubbenvorst (1953), Arcen (1961), Velden (1961), Venlo (1961), Tegelen (1949, 1951, 1955, 1961), Swalmen (1949 tot en met 1953, 1955, 1960, 1964), Maalbroek (1953, 1954, 1955, 1960), Roermond (1956), Melick (1953), Sint Odiliënberg (1949), Montfort (1959, 1960, 1961), Stein (1961, 1963), Brunssum (1959), Heerlerheide (1950), Heerlen (1960), Simpelveld (1954, 1955), Kannerbos (1950), Gronsveld (1954), Epen (1953, 1954, 1955), Vaals (1953, 1954).

Variabiliteit. f. *brunnescens* nov. Grondkleur van de voorvleugels lichter, helderder bruin. Swalmen (LÜCKER); Simpelveld (VAN DE POL); Epen, ♂, 28.VIII.1954 (holotype) plus een tweede exemplaar van hetzelfde jaar en dezelfde vindplaats (VAN WISSELINGH).

[Ground colour of the fore wings paler, of a clearer brown.]

f. *bigutta* Staudinger, 1892, *Mém. Rom.* 6 : 545. De zilvervlek op de bovenzijde van de voorvleugels in tweeën gedeeld. Maalbroek, 1953 (Mus. Rotterdam); Epen, 1954 (VAN WISSELINGH).

Plusia Ochsenheimer

Plusia chrysitis L. *Tijdschr. Entom.* 90 : 112; Cat. VIII : (522). De vlinder kan plaatselijk zeer algemeen zijn, zowel in vochtiger biotopen als in het droge duingebied, zoals de laatste jaren duidelijk gebleken is bij de inventarisaties door het RIVON: lange series uit Nijetrijne en de Peel, maar even goed uit Overveen en van de Schouwense duinen. In het Waddendistrict is de soort nu bekend van Terschelling (hier vrij gewoon volgens TANIS), Vlieland en Texel.

De vliegtijd kan van de eerste week van mei tot de derde week van oktober duren. De vroegste datum is nu 6.V, de laatste 21.X (in 1956 te Heerlen, CLAASSSENS). Daar ik door het onderzoek naar het voorkomen van de vermeende *Plusia tutti* Kostrowicki (zie *Ent. Ber.* 25 : 73—79, 1965, en 26 : 25—26, 1966) over gegevens van honderden exemplaren kon beschikken, heb ik hiervan een histogram samengesteld (zie fig. 50). Hieruit blijkt, dat de vlinder in de loop van mei geleidelijk aan gewoner begint te worden en dat de eerste generatie het talrijkst is in de tweede helft van juni en de eerste twee weken van juli. Daarna neemt het aantal duidelijk af, maar reeds in de tweede decade van augustus neemt de vlinder weer in aantal toe om in de laatste week van augustus het maximum van de tweede generatie te bereiken. Na de eerste week van september wordt het dier veel schaarser en in de laatste week van september en in oktober worden nog slechts

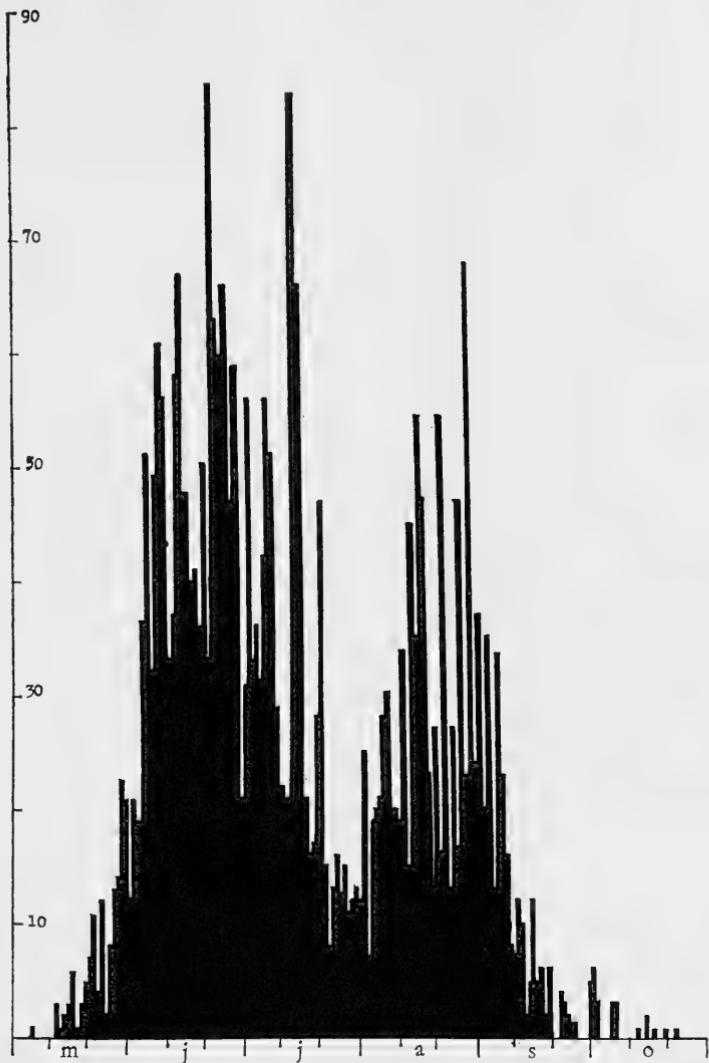


Fig. 50. Histogram van *Plusia chrysitis* L.

sporadisch exemplaren gevangen. Een scherpe grens tussen eerste en tweede generatie is er niet, al kan dit in een bepaald jaar natuurlijk wel het geval zijn. Zo nam Pater AMADEUS ALMA tussen 29.VII en 15.VIII.1965 geen enkel exemplaar waar in de val van de Plantenziektenkundige Dienst, die opgesteld stond bij de Abdij Sion (Overijssel) en die zonder onderbreking elke nacht in werking was.

De eerste generatie is wat talrijker dan de tweede. Of er nog een (zeer partiële) derde generatie kan voorkomen, is lang niet zeker. De late exemplaren zijn in de regel sterk afgevlogen. Bovendien merkte VAN AARTSEN, die de vlinder twee maal uit het ei opgekweekt heeft, dat de rupsen van hetzelfde legsel zich zeer onregelmatig ontwikkelen. Naast snel doorgroeivende exemplaren komen ook veel lang-

zamer groeiende voor en het is best mogelijk, dat late vlinders van zulke trage groeiers afstammen. Van eieren afkomstig van een wijfje van de tweede generatie verscheen een vlinder op 4 november 1964. Dit derde generatie-exemplaar kwam dus uit op een moment, dat buiten geen enkele *chrysitis* meer vliegt. En het was afkomstig van een rups, die met nog enkele andere snel doorgroei'd was, terwijl de rest van het broedsel wilde overwinteren.

Interessant is ook het (helaas zeer magere) resultaat van een eikweek van KNOOP. Van een op 3 juli 1940 gevangen ♀ verschenen drie nakomelingen nog hetzelfde jaar tussen 3 en 20 september en drie andere pas tussen 4 en 20 juni 1941. De tweede generatie kan dus partieel zijn (in welke mate dat het geval is, weten we natuurlijk nog niet) en dit verklaart, waarom het totaal aantal exemplaren ervan kleiner is dan dat van de eerste generatie.

V a r i a b i l i t e i t. Gemiddeld verschillen exemplaren van de eerste generatie door hun meerdere grootte van de later vliegende dieren. Dit is fraai te zien op plaat 1 in *Ent. Ber.* 25 (1965). Er zijn echter nogal wat uitzonderingen, dieren van de eerste generatie, die opvallend klein zijn (fig. 5 van de plaat) en exemplaren van de tweede generatie, die voor de eerste niet onder doen in grootte. Bovendien zijn er ook overgangen tussen beide grootteklassen (fig. 17 en 19). De verklaring van dit verschijnsel ligt nog in het duister.

Een ander (eveneens gradueel) verschil tussen beide generaties betreft de tekening op de voorvleugels. De twee metaalkleurige banden kunnen al of niet met elkaar verbonden zijn. Vergelijkt men nu grote aantallen met elkaar, dan blijken er duidelijke procentuele verschillen tussen de twee generaties te bestaan. Terwijl in de eerste generatie beide groepen ongeveer even talrijk voorkomen, zijn in de tweede generatie exemplaren met verbonden banden duidelijk in de meerderheid (zie de tabel).

	banden niet verbonden (bands not connected)	banden verbonden (bands connected)
generatie I	731 (49,74%)	781 (50,26%)
generatie II	248 (33,11%)	497 (66,89%)

[*Note.* The table clearly shows, that the markings on the fore wings of *Plusia chrysitis* differ in both generations. In the first generation the two coppery bands are separated nearly as often as connected. In the second generation the bands are connected much more often than separated. The most probable explanation seems to be that this character depends on a combination of hereditary and environmental factors.]

Zoals bekend variëren de banden ook sterk in kleur, van zuiver goudgeel (zeldzaam) via kopergeel (een minder diepe tint), groenachtig geel en groenachtig naar blauwgroen. Een interessante discussie hierover is te vinden in *The Entomologist* 28 (1895). Op p. 159 schrijft THORNHILL, dat van een lange gevangen serie een kwart groenbrons was en de rest goudbrons. Het volgende jaar ving hij eerst een serie zeer verse dieren en kweekte er ook een paar. Al deze dieren waren goudbrons. Later in het seizoen, toen de vlinders meer afgevlogen waren, ving hij er weer en deze waren alle groenbrons. Zijn conclusie is daarom, dat de groene tint een verkleuring is van de gouden. Deze mening wordt gedeeld door KAYE (l. c.: 181). Ook zijn gekweekte exemplaren waren alle goudkleurig, terwijl afgevlogen

dieren een groenachtige tint hadden. Op p. 204 deelt BUNN mee, dat van een serie gevangen zeer gave exemplaren ongeveer de helft goudkleurig was en de andere helft een groenachtige tint had. Tenslotte schrijft THORNHILL (p. 229), dat hij van mening is, dat de goudbronzen tint die van de pas uitgekomen vlinnders is, doch dat deze door invloed van het licht in groenbrons verandert. Jammer genoeg is later geen enkele lepidopterooloog meer op dit onderwerp terug gekomen. (De Engelse auteurs bedoelen met goudbrons of goudkleurig ongetwijfeld de gewone kopergele kleur, de echte goudkleur is veel zeldzamer.)

Na het zien van honderden exemplaren in allerlei stadia van ouderdom geloof ik, dat THORNHILL het bij het rechte eind had. Alle gekweekte vlinnders die ik gezien heb (maar dat zijn er helaas betrekkelijk weinig), hadden prachtige koperkleurige banden zonder groene tint. En ook SEPP beeldt zijn (gekweekte) exemplaren zo af (Ned. Ins. 1, vijfde stuk, Tab. I, fig. 11 en 12). Hij schrijft (l. c.: 7), dat de tint overeenkomt „met den Glans van blank geschuurd geel Koper”.

Bij de lange serie gevangen exemplaren in de collectie van het Zoöl. Mus. komen zowel exemplaren zonder als met de groene tint in het geel voor. Er is geen scherpe scheiding tussen deze twee groepen. Naarmate de dieren langer gevlogen hadden, is de groene tint intensiever. Tenslotte verandert de kleur in blauwgroen of zelfs blauwachtig. Heel verse dieren met laatstgenoemde kleuren heb ik nooit gezien en ze bestaan waarschijnlijk ook niet. De kleurvorm *scintillans* is dan ook geen echte vorm, maar een ouderdomsverschijnsel. Hetzelfde geldt waarschijnlijk voor de *virescens*-groep. Er blijken echter ook exemplaren te zijn, die nooit een groene tint krijgen, maar waarvan de banden steeds geel blijven. Wel wordt de tint steeds doffer en is tenslotte nauwelijks meer zichtbaar, maar er komt geen kleurverandering. Zo lang we door kweken niet meer van de tintverschillen van verse dieren afweten, lijkt het me het beste de groene en blauwe dieren niet meer afzonderlijk te vermelden.

Wel vermeldenswaard daarentegen zijn naar mijn mening de exemplaren met zuiver goudkleurige banden. Deze zijn van een prachtige diep donkergele kleur, die onmogelijk door verkleuring uit de koperkleurige tint ontstaan kan zijn. Deze tint is beslist zeldzaam. De enige exemplaren, die ik zelf gezien heb, zijn de volgende:

f. *disiuncta* Schultz, 1900. Met niet verbonden banden. Warga, Soest (Zoöl. Mus.); Slijk-Ewijk (VAN DE POL).

f. *aurea* Huene, 1901. De banden verbonden. Ruurlo (LUKKIEN); Groessen, Buren (VAN DE POL); Den Haag (Leids Mus.); Rotterdam (Zoöl. Mus.).

Aanvullingen op de afwijkingen in de tekening van de voorvleugels:

f. *juncta* Tutt, 1892. Zeer gewoon. Zie de tabel.

f. *decorata* Dannehl, 1933. Exemplaren met opvallend brede verbinding tussen de twee metaalkleurige banden op de voorvleugels komen in klein aantal vrij verspreid onder de soort voor, zodat geen vindplaatsen meer vermeld worden.

f. *croesus* Bryk, 1923. Exemplaren met goudkleurige nierzak komen weinig voor. Roggel (PEERDEMAN).

Dwergen. Zeer kleine exemplaren, zelfs vergeleken met die van de tweede generatie, zag ik van Apeldoorn (Zoöl. Mus.); Aerdt, Groet (PEERDEMAN).

Note. Reference is made to the observation of THORNHILL and others in *Entomologist* 28 : 159 etc. (1895) about the colour of the bands of the fore wings. THORNHILL is of opinion that all bred or very fresh specimens have coppery bands without green tint, and that this tint is only a question of fading.

Having examined hundreds of specimens in all stages from very fresh to utterly worn I am inclined to agree with THORNHILL. The older the specimens are the greener they become, till at last they are blue-green or even quite bluish. Yet there are specimens the bands of which always remain yellowish. The colour becomes duller and duller, till at last it is hardly visible, but it never shows a trace of greenish. I therefore prefer not to accept colour forms of *chrysitis* till more is known about their nature, except the rare ones with the pure deep gold colour (*disiuncta* and *aurea*).

Plusia chryson Esper. *Tijdschr. Entom.* 90 : 112; Cat. VIII : (522). Na de vijf in Cat. VIII vermelde vangsten zijn slechts twee nieuwe uit ons land bekend geworden. Erg toegenomen is de neiging om tot in Nederland door te trekken dus niet. Uit Denemarken en het omringende Duitse gebied zijn in de literatuur geen nieuwe meldingen te vinden. Wel werd de vlinder weer aangetroffen in het zuiden van Belgisch Luxemburg: Ethe-La Claireau (1939), Virton (1963), Buzenol (twee exemplaren in 1963). In het groothertogdom zelf werd in 1951 een exemplaar in de onmiddellijke nabijheid van de hoofdstad gevangen.

Van de verspreiding in het zuiden van Groot-Brittannië geeft HAGGET het volgende overzicht: zeer verbreed in het zuiden en oosten van Engeland en het zuiden van Wales tot in Cardiganshire toe. Een van de beste lokaliteiten is op het ogenblik de Test Valley in Hampshire (*Proc. Trans. South London ent. nat. Hist. Soc.* 1957 : 94—95, 1958).

De in ons land waargenomen vliegtijd ligt nu tussen half juli en eind augustus (16.VII—27.VIII).

Vindplaatsen. Lbg.: Stein, 16.VII.1963 (collectie Missiehuis); Vaals, 27.VIII.1952 (LÜCKER).

Chrysoptera Latreille

Chrysoptera c-aureum Knoch. *Tijdschr. Entom.* 90 : 121; Cat. VIII : (531). De vlinder is zonder twijfel inheems en komt lokaal vooral op moerassige plaatsen verspreid in het land voor. Hij komt goed op licht, maar is spoedig min of meer afgevlogen. Het zoeken van de rupsen is echter niet zo eenvoudig. Zie hiervoor G. DIJKSTRA in *Ent. Ber.* 21 : 182, 1961.

De vliegtijd kan al in de eerste helft van juni beginnen en voortduren tot half augustus. De uiterste data zijn nu: 10.VI—15.VIII.

Vindplaatsen. Fr.: Wolvega (CAMPING, G. DIJKSTRA, rupsen en vlinders). Gr.: Ter Borgh, 28.VII.1956 (BLOM). Ov.: Wiene, 21.VII.1951 (KLEINJAN); Kalenberg (hier bleek de soort gewoon te zijn tijdens het Rivon-onderzoek in 1964 en 1965, AUKEEMA); Marknesse, 7.VII.1959 (VAN DE POL). Gdl.: Slijk-Ewijk, 10.VII.1961 (dezelfde). Utr.: Amerongen, 7.VII.1959 (BENTINCK); Botshol (gewoon, LOURENS c. s.). N.H.: 's-Graveland, 26.VI.1959 (Nat.hist. Mus. Zaandam); Bussum, 10.VII.1958, 23.VI.1960 (TER LAAG); Aalsmeer, 27.VII.1957 (KEESSEN). Z.H.: Noorden, 1956 en volgende jaren geregeld (LUCAS); Arkel, 10.VI.1962, 1964, 1965, vlinders en rupsen (SLOB, ZWAKHALS). N.B.: Sprang, 4.VII.1954 (DIDDEN).

Polychrisia Hübner

Polychrisia moneta Fabricius. *Tijdschr. Entom.* 90: 120; Cat. VIII: (530). Het voorkomen van de vlinder hangt af van de aanwezigheid van ridderspoor en monnikskap in tuinen. In de regel is het dier vrij schaars, althans op licht, in sommige jaren echter veel talrijker. Zo was de eerste generatie in 1956 talrijk te Bennekom, de tweede in 1953 (VAN DE POL). LEFFEF vermoedt, dat de vlinder vooral in de schemering vliegt en dan bloemen bezoekt, zodat hij schaarser lijkt dan hij in werkelijkheid is (in litt.). De rupsen zijn in elk geval niet zelden in het voorjaar op de voedselplanten in aantal te vinden.

In het Waddendistrict is de soort nu van één van de eilanden bekend. Interessant is, dat het eerste exemplaar voor Ierland pas in 1939 werd gevangen, het tweede in 1952 (E. S. A. BAYNES, *Ent. Gazette* 4: 286, 1953).

De vliegtijd van de tweede generatie kan al half augustus beginnen (17.VIII. 1943, e. l., 19.VIII.1959, wild, LUCAS) en voortduren tot half oktober (14.X. 1953, Wageningen, VAN DE POL).

Vindplaatsen. Fr.: Terschelling (LEFFEF), Sexbierum, Leeuwarden, Oenkerk, Wijnsjeterp, Nijetrijne, Oudemirdum, Rijss, Tjerkwerd. Gr.: Haren, Glimmen, Veendam. Dr.: Roden, Steenbergen, Een, Westervelde, Eelde, Zuidlaren, Eext, Schoonlo. Ov.: Rechteren, Raalte, Abdijsion, Deventer, Zwolle, Vollenhove, Kalenberg, Marknesse. Gdl.: Harderwijk, Epe, Vaassen, Wiessel, Teuge, Lunteren; Gorssel, de Voorst, Eefde, Warnsveld, Ruurlo, Hoog-Keppel, Groessen; Slijk-Ewijk, Rumpt (gem. Deil). Utr.: Doorn, Botshol. NH.: 's-Graveland, Blaricum, Bussum, Naarden, Weesp, Amsterdamse Bos (PEERDEMAN vond eens een spinsel op kardinaalsmuts!), Halfweg, Landsmeer, Wormerveer, Beemster, Oosthuizen, Hoorn, Groet, Schoorl, Bergen. Z.H.: Oegstgeest, Leidschendam, Capelle aan den IJssel, Krimpen aan den IJssel, Arkel, Gorkum, Schelluinen, Hendrik-Ido-Ambacht, Oostvoorne, Hellevoetsluis, Oude Tonge. Zl.:burgh, Haamstede, Westenschouwen. N.B.: Waalwijk, Valkenswaard, Geldrop, Helenaveen. Lbg.: Sevenum, Moesel, Belfeld, Montfort, Amstenrade, Chèvremont, Bocholtz, Gronsveld, Vaals.

Variabiliteit. f. *pallidescens* Lempke, 1949. Een enkele keer hebben exemplaren van de tweede generatie dezelfde grondkleur als die van de eerste, maar in de regel zijn ze toch iets kleiner. Exemplaren van de eerste generatie met de lichte grondkleur zijn vermoedelijk niet al te zeldzaam. In Zoöl. Mus. nog van Apeldoorn, Twello, Hilversum, Leidschendam. Verder bekend van Voorburg (LUCAS).

Een fraai exemplaar van deze bleke vorm uit de collectie-VAN WISSELINGH is afgebeeld op plaat 7 fig. 7.

f. *aurea* Lempke, 1949. Geen nieuwe vindplaatsen.

f. *obscura* nov. Grondkleur van de voorvleugels sterk verdonkerd, achtervleugels zwartachtig, vooral langs de achterrond. Plaat 7 fig. 8. Halfweg, ♂, 8.IX. 1963 (holotype, VAN AARTSEN, in Zoöl. Mus.), plus een tweede minder extreem exemplaar van dezelfde vindplaats van 20.VI.1959; Wormerveer (HUISEN).

[Ground colour of the fore wings strongly darkened, hind wings blackish, especially along the outer border.]

f. *maculata* Lempke, 1949. Het holotype is afgebeeld op plaat 7 fig. 9. Nieuwe vondsten zijn niet bekend.

f. *renitangens* Lempke, 1949. De vorm, waarbij de nierzak aan boven- en onderzijde de middenschaduw raakt, zijn niet zeldzaam en komen waarschijnlijk

op de meeste plaatsen onder de soort voor, zodat geen vangsten meer vermeld worden.

Dwerg. Zeist (Zoöl. Mus.).

Pathologisch exemplaar. Een exemplaar met onregelmatige witte vlekken op de achtervleugels van Oosthuizen (DE BOER).

Abrostola Ochsenheimer

Abrostola trigemina Werneburg (*triplasia* auct. nec Linnaeus). *Tijdschr. Entom.* 90 : 122; *Cat. VIII* : (532). De soort dus met (bij typische exemplaren) licht bruinachtig wortelveld op de bovenzijde van de voorvleugels en iets gegolfde tweede dwarslijn. Reeds in 1864 toonde WERNEBURG aan, dat dit niet de door LINNAEUS beschreven soort is (Beitr. Schmetterl.k. 1 : 247—248), maar pas in de moderne publicaties wordt zijn correctie toegepast (o.a. in de nieuwe editie van „SOUTH”).

Uit beide lijsten van vindplaatsen blijkt, dat de vlinder over vrijwel het gehele land verbreid is. Opvallend is het grote aantal nieuwe vindplaatsen in het westen. Hier en in het noorden is de soort beslist gewoner dan de volgende. In het zuiden van het land is op vele plaatsen daarentegen het omgekeerde het geval. Tot nog toe pas op één van de waddeneilanden aangetroffen.

Wat de vliegtijd betreft, zekere data van de derde generatie zijn thans: 17.IX—10.X. De zeer late datum werd in 1962 genoteerd door VAN AARTSEN.

Vindplaatsen. Fr.: Terschelling (LEFFEF), Sexbierum, Friens, Beetsterzwaag, Oosterwolde, Nijetrijne, Oudemirdum, Rijs, Tjerkwerd. Gr.: Borgercompagnie, Veendam. Dr.: Paterswolde, Een, Westervelde, Donderen, Zuidlaren, Eext, Schoonlo, Hooghalen, Vledder. Ov.: Volthe, Albergen, Weerselo, Saasveld (Molenven), Rectum, Enschede, Wiene, Delden, Holten, Balkbrug, Dalfsen, Raalte, Abdij Sion, IJsselmuizen, Zwartsluis, Vollenhove. Gdl.: Ermelo, Leuvenum, Vierhouten, Wezep, Wiessel, Hoog-Soeren, Teuge, Wilp, Laag-Soeren, Lunteren; Gorssel, de Voorst, Eefde, Almen, Wientjesvoort, Ruurlo, Winterswijk, Hoog-Keppel, Didam, Aerdt; Berg en Dal, Ochten, Buren, Slijk-Ewijk, Neerijnen. Utr.: Grebbe, Maarsseveen, Vinkeveen, Botshol. N.H.: Blaricum, Ankeveen, Bussum, Naarden, Naardermeer, Weesp, Amsterdamse Bos, Halfweg, Zaandam, Wormerveer, Oost-Knollendam, Beemster, Hoorn, Den Helder, Schoorl, Bergen, Heemskerk, Overveen. Z.H.: Woerdense Verlaat, Noorden, Katwijk, Meijendel, Voorschoten, Leidschendam, Den Haag, Loosduinen, Delft, Staelduin, Vlaardingen, Capelle aan den IJssel, Krimpen aan den IJssel, Arkel, Gorkum, Schelluinen, Dubbeldam, Hendrik-Ido-Ambacht, Barendrecht, Oostvoorne, Rockanje, Hellevoetsluis, Sommelsdijk, Ouddorp. ZL.: Burgh, Haamstede, Westenschouwen (op Schouwen veel minder dan de volgende soort, LEFFEF), Oostkapelle, Valkenisse, Cadzand. N.B.: Chaam, Oosterhout, Drunen, Haaren, Kampina, Sint Michielsgestel, Boxtel, Oirschot, Acht, Overwetten, Eindhoven, Vessem, Someren, Helenaveen, Sint Anthonis, Uden. Lbg.: Griendseveen, Sevenum, Moesel, Roggel, De Hamert, Swalmen, Maasniel, Sint Odiliënberg, Montfort, Stein, Sittard, Geleen, Heerlerheide, Heerlerbaan, Chèvremont, Bocholtz, Geulem, Bunde, Cannerbos, Sint Pietersberg, Heer, Vijlen, Lemiers, Vaals.

Variabiliteit. f. *monotona* Lempke, 1949. De eenkleurig donkere vorm werd nog aangetroffen te Eindhoven (VAN DULM).

f. *juncta* Lempke, 1949. Bennekom (VAN DE POL); Breda (Zoöl. Mus.).

f. *semiconfluens* Lempke, 1949. Breda (Zoöl. Mus.).

Dwergen. Apeldoorn, Valkenburg (Zoöl. Mus.); Melissant (HUISMAN).

Abrostola triplasia L., 1758 (*tripartita* Hufnagel, 1766). *Tijdschr. Entom.* 90: 123; Cat. VIII: (533). De soort met (bij typische exemplaren) licht wortelveld en licht achterrandsveld, terwijl de tweede dwarslijn alleen iets gebogen is.

In de noordelijke helft (ongeveer tot aan de grote rivieren) is de vlinder bijna overal duidelijk minder gewoon dan de vorige soort, in de zuidelijke helft daarentegen is in de regel het omgekeerde het geval. Hoewel vindplaatsen op de Veluwe bekend zijn, schrijft LEFFEF me, dat hijzelf de soort nog nooit daar heeft aange troffen, wat wel iets zegt omtrent de zeldzaamheid in dit gebied. In de hierna volgende lijst van nieuwe vindplaatsen valt ook het kleine aantal ten noorden van Rijn en Lek op (slechts één enkele op de Veluwe!). Tussen de grote rivieren wordt het al dadelijk beter (ook in het westen) en vooral Limburg komt met een lange serie goed uit de bus. Mogelijk hebben we in dit geval met klimatologische invloeden te doen.

In het Waddendistrict is ook deze soort slechts van één van de eilanden bekend.

De vlinder kan in gunstige voorjaren al in de tweede helft van april beginnen te vliegen. De vroegste datum is nu 19 april (in 1964 te Nuenen, NEIJTS). De tweede generatie kan eveneens belangrijk vroeger verschijnen dan in 1949 bekend was. Van een op 29 juni gevonden rups kwam de vlinder reeds op 22.VII uit de pop (HUISMAN). Er zal dan ook zeer waarschijnlijk geen scherpe grens tussen beide generaties bestaan. De vliegtijd kan iets later eindigen dan in Cat. VIII vermeld is: op 11.IX.1963 nog een exemplaar te Stein (collectie Missiehuis). Duidelijke aanwijzingen van een derde generatie kan ik bij deze soort evenwel niet vinden.

Vindplaatsen. Fr.: Terschelling (weinig, LEFFEF), Leeuwarden, Tietjerk, Wijnserterp, Oosterwolde, Nijetrijne, Oudemirdum, Tjerkwerd. Gr.: Delfzijl, Veendam. Dr.: Veenhuizen, Donderen, Eext, Schoonlo. Ov.: Volthe, Almelo, Enschede, Delden, Abdij Sion, Vollenhove. Gdl.: Hoenderlo; Eefde, Warnsveld, Winterswijk, Hoog-Keppel (hier vrij gewoon, LEFFEF), Aerdt; Ubbergen, Malden, Slijk-Ewijk, Ochten, Buren, Geldermalsen, Neerijnen. Utr.: Utrecht. N.H.: Amsterdamse Bos, Schoor (heel weinig, LEFFEF), Bergen, Castricum, Heemskerk, Santpoort, Bloemendaal, Heemstede. Z.H.: Noorden, Rijswijk, Staelduin, Capelle aan den IJssel, Vianen, Arkel, Gorkum, Schelluinen, Dubbeldam, Hendrik-Ido-Ambacht (meer dan de vorige soort!), Barendrecht, Rhoon, Brielle, Oostvoorne, Rockanje, Hellevoetsluis, Middelharnis, Ouddorp. Zl.: Burgh, Haamstede, Westenschouwen (op Schouwen veel gewoner dan de vorige soort volgens de inventarisatiegegevens van het Rivon), Oostkapelle, Valkenisse, Cadzand. N.B.: Wouw, Roosendaal, Ulvenhout, Tilburg, Waalwijk, Drunen, Sint Michielsgestel, Kampina, Best, Acht, Nederwetten, Eindhoven, Vessem, Bergeijk, Heeze, Someren, Deurne, Mill, Gassel. Lbg.: Mook, de Hamert, Arcen, Horst, Sevenum, Griendsveld, Moesel, Roggel, Swalmen, Heel, Sint Odiliënberg, Montfort, Stein, Sittard, Amstenrade, Heerlerheide, Heerlen, Heerlerbaan, Chèvremont, Bocholtz, Geulem, Ulestraten, Bunde, Kannerbos, Sint Pieter, Gronsveld, Rijckholt, Heer, Noorbeek, Camerig, Cottessen, Vijlen, Lemiers, Vaals.

Variabiliteit. HÜBNER's *urticae* is niet te scheiden van de typische vorm. Alle exemplaren met min of meer wit afgezette dwarslijnen moeten hiertoe gerekend worden.

f. *plumbea* Cockayne, 1947. Naast de eenkleurig donkere exemplaren komen er ook voor met even donkere voorvleugels, maar die iets van de witte tekening in wortel- en achterrandsveld bezitten. Ook COCKAYNE vermeldt zulke exemplaren. De vorm is afgebeeld op plaat 7 fig. 11. Oude Nederlandse exemplaren bestaan

er niet van. Het is stellig een moderne melanistische vorm, die zich bovendien snel uitgebreid heeft. Kon in Cat. VIII nog slechts één vindplaats vermeld worden, thans zijn vooral in het zuiden en midden van Limburg tal van vindplaatsen bekend, waaraan die in het oosten van Noord-Brabant aansluiten. Ook in Zeeland zijn al exemplaren gevangen, bovendien in Twente. Nergens is de vorm echter zo verbreid als in het zuidoosten van het land. Hier werd hij ook voor het eerst waargenomen (Valkenburg, 1910).

In het Limburgs-Oostbrabantse gebied komt de vorm thans praktisch op alle vindplaatsen onder de soort voor, zodat deze niet opnieuw opgesomd behoeven te worden. Daarbuiten ken ik thans de volgende: Volthe (VAN DER MEULEN); Bennekom (Landb. Hschool); Aerdt (PEERDEMAN); Aerdenhout, Bergeijk (VAN WISSELINGH); Gorkum (BRANGER); Ouddorp (VROEGINDEWEIJ); Haamstede (Zoöl. Mus.); Sint Michielsgestel (KNIPPENBERG).

f. *juncta* Lempke, 1949. Oostvoorne (LUCAS); Gronsveld (Zoöl. Mus.).

f. *semiconfluens* Lempke, 1949. Gewoon, van tal van vindplaatsen bekend. Dwergen. Delft (A. VAN BEEK); Montfort (MAASSEN).

CATOCALINAE

Mormonia Hübner

Mormonia sponsa L. *Tijdschr. Entom.* 90 : 101; Cat. VIII : (511). De in 1949 gegeven verspreiding is goed. Het aantal nieuwe vindplaatsen is klein. LEFFEF schreef me enkele interessante details over het gedrag van het dier. In 1946 zag hij op klaarlichte dag twee exemplaren, die steeds maar om een middelgrote eik vlogen langs de weg van Hoenderlo naar Otterlo. Aan de stam was geen lekkende plek, zodat het niet om het sap te doen geweest kon zijn. Zijn ervaring is overigens dat de vlinder in de schemering begint te vliegen en dan zeer schuw is. Na half elf komen de dieren goed op de stroop en zitten dan zelfs in het felle licht van een sterke lamp goed vast. Maar op menglichtlampen en kwik-damplampen komen ze maar heel zelden, evenmin trouwens als *Catocala promissa*.

Geen correctie op de vliegtijd, die dus blijft: 10.VII—16.IX.

Vindplaatsen. Ov.: Volthe, Borne, Abdij Sion. Gdl.: Vaassen, Wiessel (in 1925 en 1926 op smeer, later nooit meer, LEFFEF), Hoenderlo; Hackfort, Wientjesvoort, Groenlo, Miste, Bijvank, Babberich. Utr.: Hollandse Rading. N.H.: Bussum (14.VIII.1963, A. VAN TUIJL), Amsterdamse Bos (1947, NIEUWLAND). Lbg.: Bocholtz.

Varia bilit eit. f. *demaculata* Heinrich, 1916. Apeldoorn (Zoöl. Mus.).

f. *fasciata* Spuler, 1908, Schmetterl. Eur. 1 : 367 (*variegata* Lempke, 1949). Geen nieuwe vangsten.

f. *brunnea* nov. Grondkleur van de voorvleugels zuiver bruin zonder grijs of zwart. Paterswolde, ♀, 7.VII.1905, a. o. (holotype, plus een tweede ♀ van dezelfde kweek; Zoöl. Mus.).

[Ground colour of the fore wings pure brown without grey or black.]

Catocala Schrank

Catocala fraxini L. *Tijdschr. Entom.* 90 : 104; Cat. VIII : (514). De vlinder blijft een grote zeldzaamheid, die zeer onregelmatig nu eens hier, dan weer daar

wordt gevangen. Ik geloof dan ook, dat hij niet in staat is zich hier te handhaven, maar dat hij steeds weer opnieuw naar ons land moet immigreren. De hiaten in de jaren van waarneming en de zeer kleine aantallen zijn hiervoor wel een sterke aanwijzing.

Merkwaardig is, dat de soort na de Tweede Wereldoorlog vaste voet in het zuiden van Engeland gekregen heeft. Zowel in Kent als in Norfolk zijn herhaaldelijk vlinders gevangen en rupsen gevonden (zie T. G. HOWARTH, 1950, *Ent. Gazette* 1 : 41—46). De laatste jaren heb ik geen enkele melding meer in de Engelse tijdschriften gezien, zodat het de vraag is, of deze vestiging wel duurzaam geweest is.

De vliegtijd kan al in de eerste helft van juli beginnen. Reeds 10.VII.1956 werd een exemplaar te Epe gevangen. De slotdatum verschuift ook iets: de laatste dag van waarneming wordt nu 13.X (in 1953 te Bennekom).

Vindplaatsen. Fr.: Wolvega, juli 1955 (VAN TUIJL); Rijss, 5.VIII.1950 (O. DE VRIES). Ov.: Almelo, 17.VIII.1940 (KNOOP). Gdl.: Epe, 10.VII.1956 (W. DE VRIES); Bennekom, 13.X.1953 (VAN DE POL); Ulenpas, 17.IX.1956 (LEFFEF); Nijmegen, 1928, e. 1. (Zoöl. Mus.); Wijchen, 23.VIII.1964 (AARTS). Utr.: Rhenen, 11.IX.1958 (Mus. Rotterdam); Maarn, 9.IX.1952 (BERK); Linschoten, 4.VIII.1964 (VAN DER VOO). N.H.: Amsterdam, 25.IX.1939 (Zoöl. Mus.), VIII.1952 (T. VAN DIJK); Den Helder, 1939 (NIESTHOVEN); Heemskerk, 3.IX.1949 (BANK); Bloemendaal, 23.IX.1956 (ALDERS); Heemstede, 25.IX.1956 (VAN DE POL). Z.H.: Leiden, 23.VIII.1950 (J. KROON); Meijendel, 1954 (VAN TOL); Den Haag, 16.VIII.1950 (Zoöl. Mus.); Kethel, 18.IX.1954 (W. VINK). N.B.: 's-Hertogenbosch, 1910 (Plantenz. Dienst). Lbg.: Swalmen, 27.IX.1950 (PIJPERS); Kerkrade, 1955 (volgens LUKKIESEN); Vaals, 1946 (plus vier ongedateerde exemplaren, JUSSEN), 28.VII.1949 (JACOBI), 1953 (volgens GERRIS).

Variabiliteit. f. *moerens* Fuchs, 1889. Slechts enkele exemplaren van deze vorm werden nog gevangen: Epe (W. DE VRIES); Maarn (BERK).

Catocala nupta L. *Tijdschr. Entom.* 90 : 103; *Cat. VIII* : (513). De in 1949 gegeven verbreiding is goed. In het Waddendistrict is de vlinder nu bekend van de volgende eilanden: Schiermonnikoog (VAN MINNEN), Terschelling (hier gewoon, LEFFEF), Vlieland (CAMPING).

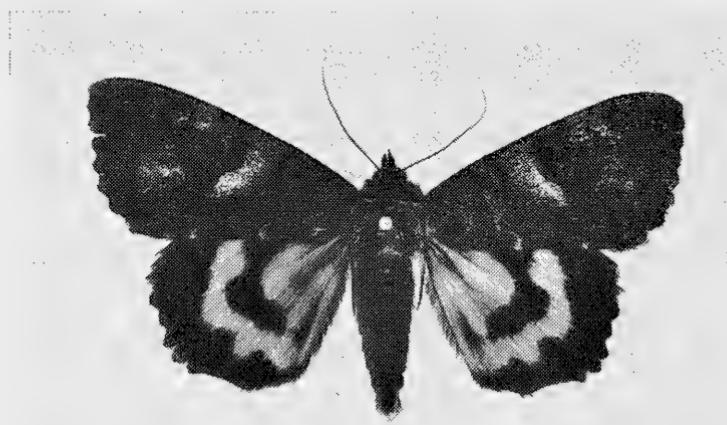
De vliegtijd kan tot in november duren: 8.XI.1962, Burgh (LEFFEF), 9.XI.1962, Hendrik-Ido-Ambacht (BOGAARD), 10.XI.1949, Heemstede (VON HERWARTH), zodat de uiterste grenzen nu worden: 10.VII—10.XI.

Variabiliteit. f. *variegata* Lempke, 1949. De vorm met bonte voorvleugels werd nog aangetroffen te Empe, Vijlen (Zoöl. Mus.); Middelie (DE BOER); Sint Michielsgestel (KNIPPENBERG); Gassel, Rijckholt (VAN DE POL); Swalmen (Mus. Rotterdam); Lemiers (DELNOYE).

f. *nigrata*, nom. nov. pro *nigra* Cockayne, 1951, *Ent. Rec.* 63 : 162, pl. V, fig. 4, nec Lempke, 1949. Thorax en voorvleugels bijna zwart; op de voorvleugels nog sporen van de lichte vlek onder de nierzak en van de lichte golflijn. Amsterdam, ♂, 25.IX.1961 (VAN AARTSEN, in Zoöl. Mus.). Fig. 51.

f. *sanguinea* Lempke, 1949. Exemplaren met dieprode achtervleugels zijn niet zeldzaam en komen verbreid onder de soort voor.

f. *salmonaea* Cockayne, 1946. Exemplaren met rose achtervleugels zijn zeldzaam.



Fot. J. HUISENGA

Fig. 51. *Catocala nupta* L., f. *nigrata* nov.

Nieuwe vindplaatsen: Steenwijk (VAN WISSELINGH); Apeldoorn (LUCAS); Beemster (HUISENGA).

f. *caeruleescens* Cockerell, 1889. Van deze rariteit zag ik een exemplaar, dat gekweekt werd uit een rups van Rotterdam en 17.VIII.1955 uit de pop kwam (VAN TUIJL).

f. *concubina* Borkhausen, 1792. De vorm, waarbij de zwarte middenband van de achtervleugels tot de binnenrand doorloopt, blijkt in de lange serie in het Zoöl. Mus. gewoner te zijn dan de typische vorm, waarbij de band de binnenrand niet bereikt.

Dwergen. 's-Graveland (Zoöl. Mus.); Rotterdam (VIS); Dordrecht (VERHEIJ); Nuenen (NEIJTS); Maastricht (KORTEBOS).

P a t h o l o g i c h e e x e m p l a r e n. Linker achtervleugel; zwarte achterrandsband bij de apicale hoek verbleekt. Rotterdam (VAN DER AA).

Linker achtervleugel: een lichte vlek in de rode middenband. Hoog-Keppel (Zoöl. Mus.).

Rechter achtervleugel: de basale helft verbleekt. Hoog-Keppel (Zoöl. Mus.).

Beide achtervleugels: een brede baan langs de voorrand verbleekt. Eindhoven (HAANSTRA).

Catocala electa Borkhausen. *Tijdschr. Entom.* 90 : 103; Cat. VIII : (513). Geen nieuwe vangsten, noch in ons land, noch in de ons omringende gebieden. Alleen vond ik in een collectie nog een exemplaar, dat indertijd aan de aandacht ontsnapt is, zodat het totale aantal, dat uit ons land bekend is, acht stuks bedraagt.

V i n d p l a a t s. Z.H.: Alblasserdam, 23.VIII.1900 (RIJK).

Catocala promissa Esper. *Tijdschr. Entom.* 90 : 101; Cat. VIII : (511). Het voorkomen in ons land blijft even raadselachtig als het in 1949 was. Na de publicatie van Cat. VIII in 1949 is de vlinder slechts in enkele jaren bij ons aangetroffen. Heel wonderlijk is daar een vangst bij van een grote serie in de omgeving

van Apeldoorn, die bestond uit vrijwel alleen prachtige gave exemplaren, wat de indruk wekt, dat ze ook in die omgeving hun ontwikkeling doorgemaakt hadden. Maar alle pogingen de soort in latere jaren op dezelfde plaats terug te vinden, hebben tot nog toe schipbreuk geleden. Het is daarom niet uitgesloten, dat de vlinder niet in staat is zich hier te lande constant te handhaven, een conclusie, die me in 1949 ook al de meest waarschijnlijke leek.

Uit het omringende gebied zijn mij geen nieuwe gegevens bekend geworden.

Een kleine correctie op de vliegtijd, waarvan de uiterste data nu worden: 15.VI—20.VIII.

Vindplaatsen. Dr.: Eelde, 20.VIII.1955 (Koor leg., Zoöl. Mus.). Gdl.: Ermelo, 1964 (BOGAARD); Apeldoorn, VIII.1946, één exemplaar (BANK), van 15.VII—15.VIII.1953 niet minder dan 33 exemplaren (LEFFEF, een kleine serie hiervan bevindt zich in Zoöl. Mus.). Lbg.: Rijckholt, 21.VIII.1954 (VAN DE POL); Nieuwenhagen, vers ♂ in 1965 (NEIJTS); Vaals (geen datum, JUSSEN).

Variabiliteit. f. *contigua* Lempke, 1949. Apeldoorn (Zoöl. Mus.).

Minucia Moore

Minucia lunaris Schiff. *Tijdschr. Entom.* 90 : 106; Cat. VIII : (516). De vinder komt in hoofdzaak op de zandgronden van het binnenland voor. In het Duindistrict is hij veel lokaler.

Geen correctie op de vliegtijd, die blijft: 25.IV—7.VII.

Vindplaatsen. Fr.: Beetsterzwaag, Balk. Dr.: Norg, Westervelde, Schoonlo, Odoornerveen, Hoogeveen, Dwingelo. Ov.: Volthe, Rijssen, Eerde, Vilsteren, Raalte, Tjoeene, Platvoet. Gdl.: Terschuur, Barneveld, Ermelo, Epe, Wiessel, Empe, Hoenderlo, Harskamp, Kootwijkerveen, Ede; Gorssel, Almen, Ruurlo, Groesbeek. Utr.: Rheden, Amerongen, Doorn, Driebergen, Zeist, Woudenberg, Leusden, Vlasakkers. N.H.: Laren, Naarden, Aerdenhout. Z.H.: Katwijk. Zl.: Oostkapelle. N.B.: Princenhage, Kampina, Geldrop, Maarheeze, Mill. Lbg.: Geijsteren, Arcen, Belfeld, Roggel, Maalbroek, Montfort, Stein, Schinveld, Gronsveld, Vijlen, Vaals.

Variabiliteit. f. *meretrix* Fabricius, 1781. De vorm met witte (eigenlijk licht gele) dwarslijnen werd aangetroffen te Dwingelo, Hilversum (Zoöl. Mus.); Bennekom (VAN DE POL).

f. *bitincta* Dannehl, 1926. Nieuwe vindplaatsen: Dwingelo (Zoöl. Mus.); Aalten (VAN GALEN).

f. *clara* Lempke, 1949. Zeist (Zoöl. Mus.).

f. *marginata* nov. Bovenzijde voorvleugels: ruimte tussen golflijn en achterrand donker, scherp afstekend. Hoenderlo, Dabbelo, Bilthoven, Hilversum, Breda (Zoöl. Mus.). Blijkbaar geen al te zeldzame vorm.

Holotype: ♀ van Hilversum, 25.IV.1948, in Zoöl. Mus.

[Upper side fore wings: area between submarginal line and fringe dark, sharply contrasting.]

f. *ochrea* Krombach, 1919. Geen nieuwe gegevens.

f. *brunnea* Lempke, 1949. Deurne (Zoöl. Mus.).

f. *brunneogrisea* Lempke, 1949. Norg, Apeldoorn, Soest, Breda (Zoöl. Mus.).

f. *obscura* Favre, 1899. Dwingelo (Zoöl. Mus.).

f. *nigromarginata* nov. De band langs de achterrond van de achtervleugels is niet donker bruinachtig, maar zwart. Bergeijk, ♀, 13.V.1966 (holotype, VAN WISSELINGH).

[The band along the outer border of the hind wings is not dark brownish, but black.]

f. *privata* Dannehl, 1926. Apeldoorn (Zoöl. Mus.); Bennekom (VAN DE POL); Aalten (VAN GALEN); Aerdenhout (VAN WISSELINGH).

f. *cingulata* Lempke, 1949. Vrij gewoon.

f. *clausa* Lempke, 1949. Hulshorst, Hilversum (Zoöl. Mus.).

f. *simplex* nov. De geelachtige lijn, die langs de eerste en de tweede dwarslijn loopt, ontbreekt. Bennekom, ♂, 15.V.1953 (holotype, VAN DE POL).

[The yellowish line which borders the antemedian and the postmedian, is absent.]

f. *fuscociliata* nov. Voorvleugels met scherp afstekende donkere franje. Montfort, ♀, 2.IV.1961 (holotype, MAASEN).

[Fore wings with sharply contrasting dark fringes.]

Callistegi Hübner

Callistegi mi Clerck. *Tijdschr. Entom.* 90 : 108; Cat. VIII : (518). Van de waddeneilanden is de vlijnder nu ook bekend van Vlieland (CAMPING) en Terschelling. Op het laatstgenoemde eiland trof LEFFEF hem heel gewoon aan, zowel in het duin als in de polders en langs de dijken. Alleen Rottum ontbreekt dus nog in de rij. Overigens is niets nieuws over de verspreiding te vermelden.

De normaal enige generatie kan nog iets vroeger beginnen te verschijnen dan in 1949 bekend was. De vroegste datum is nu 2.V (1946, Heemskerk, LUCAS). Een tweede juli-vangst is 16.VII.1949 op Texel. Mogelijk was dit een vertegenwoordiger van een overigens wel erg zeldzame tweede generatie. Zeker behoorde er het exemplaar toe, dat VAN OORSCHOT 30.VIII.1949 te Nijverdal ving.

Variabiliteit. Typische exemplaren met witte achtervleugels (of sterke overgangen met bijna witte vleugels) komen op de meeste plaatsen onder de soort voor.

f. *illuminata* Warren, 1913. Deze lichte scherp getekende vorm is niet zeldzaam en komt vrijwel overal onder de soort voor.

f. *obscura* Lempke, 1949. Ook deze vorm is niet zeldzaam, bekend van tal van vindplaatsen.

f. *desagittata* nov. De zwarte wigvormige vlekken aan de binnenzijde van de golflijn op de bovenzijde van de voorvleugels ontbreken geheel. Nuenen, ♀, 1.VI.1950 (holotype, NEIJTS).

[The black sagittate markings on the inner side of the submarginal line on the upper side of the fore wings fail completely.]

Dwergen. Vogelenzang (Zoöl. Mus.); Schore (WILMINK). (Volgens WILMINK zijn alle Zeeuwse exemplaren van de soort kleiner dan die van andere vindplaatsen. Ik kan dit door gebrek aan materiaal noch bevestigen noch ontkennen).

Ectypa Billberg

Ectypa glyphica L. *Tijdschr. Entom.* 90 : 109; *Cat. VIII* : (519). De in 1949 aangegeven verspreiding is in grote trekken juist. De vlinder is nu van een der waddeneilanden bekend geworden. In het Hafdistrict is hij een rariteit en ook in het Duindistrict wordt *glyphica* maar weinig aangetroffen. In het Fluviaal District komt hij meer voor. Maar opvallend is vooral zijn sterke verspreiding in het zuiden en midden van Limburg. Hier is de vlinder wel overal aan te treffen, waar voldoende klaver groeit.

De eerste generatie kan iets eerder beginnen te vliegen dan in 1949 bekend was en de tweede kan iets later eindigen. De uiterste data van beide generaties worden nu: I van 21.IV—30.VI en II van 7.VII—9.VIII. Het valt me op, dat de collectie van het Zoöl. Mus. veel meer materiaal van de eerste generatie bevat dan van de tweede. Zeer waarschijnlijk is de laatste slechts partieel.

Vindplaatsen. Fr.: Terschelling (in de Kooibosjes en langs de dijk bij West-Terschelling, LEFFEF). Gr.: Onstwedde, Vlagtwedde, Laude. Dr.: Veenhuizen, Vries, Zuidlaren, Annen, Anlo, Eext, Schoonlo, Lheebroek. Ov.: Brekkelenkamp, Volthe, Agelo, Ootmarsum, Reutum, Weerselo, Borne, Bornerbroek, Stokkum, Buurse, Haaksbergen, Delden, Hardenberg, Stegeren, Junne, Vilsteren, Oudleusen, Rechteren, Raalte, Zandbelt, Frieswijk, Zwolle, Vollenhove, Noordoostpolder. Gdl.: Wapenveld, Wiessel, Teuge, Laag-Soeren; Eefde, Zutphen, Harfsen, Hoog-Keppel, 's-Heerenberg, Tolkamer; Berg en Dal, Elst, Culemborg. Utr.: Grebbe, Renswoude, Amerongen, Wijk bij Duurstede. N.H.: Hoorn. Z.H.: Schelluinen, Ottoland, Sliedrecht (31.V.1957 bij honderden, BOGARD). Zl.: Burgh. N.B.: Hilvarenbeek, Kaatsheuvel, Drunen, Sint Michielsgestel, Oirschot, Nederwetten, Nuenen, Valkenswaard, Geldrop, Liessel, Deurne, Veghel. Lbg.: Griendsveld, Belfeld, Swalmen, Haelen, Herkenbosch, Maasbracht, Vlodrop, Montfort, Roosteren, Born, Stein, Katsop, Huls, Welterberg, Colmond, Eijs, Wijlre, Schin op Geul, Bemelen, Cadier, Gronsveld, Mesch, Camerig, Nijswiller.

Variabiliteit. *f. marginata* Spuler, 1907. Nieuwe vindplaatsen: Bornerbroek (KLEINJAN); Ingen (Zoöl. Mus.); Nuenen (NEIJTS).

f. tristicula Schultz, 1908. Deze extreem donkere vorm is blijkbaar een zeldzaamheid. Ik ken er geen enkele nieuwe vindplaats van.

f. meridionalis Strand, 1901. Slechts één nieuwe vindplaats: Welterberg (VAN WISSELINGH).

f. demaculata nov. Bovenzijde voorvleugels: de donkere subapicale vlek ontbreekt. Schelluinen, klein ♀, 17.V.1964 (holotype, ZWAKHALS).

[Upper side fore wings: the dark subapical spot is absent.]

f. costovata Foltin, 1944. Nieuwe vindplaatsen: Wiessel, Oisterwijk, Deurne (Zoöl. Mus.).

f. angustelineata Lempke, 1949. Nieuwe vindplaatsen: Wiessel (Zoöl. Mus.); Schelluinen (LUCAS); Montfort (MAASSEN).

f. obsoleta Strand, 1901. De vorm is vrijwel overal onder de soort aan te treffen. Alle exemplaren in Zoöl. Mus. zijn mannetjes!

f. lata Strand, 1901. Schelluinen (LUCAS); Welterberg, Epen (VAN WISSELINGH).

Dwergen. Norg, Arnhem (Zoöl. Mus.); Albergen (VAN DER MEULEN); Schelluinen, Maastricht (LUCAS).

OTHREINAE

Scoliopteryx Germar

Scoliopteryx libatrix L. *Tijdschr. Entom.* 90 : 124; *Cat. VIII* : (534). De vlinder is door CAMPING op Vlieland aangetroffen, zodat hij nu van vier van de waddeneilanden bekend is. Overigens komt hij overal voor, waar maar smalbladige wilgen groeien.

De vroegste datum, waarop een overwinterend exemplaar werd gevangen, is thans 1 maart. Op die datum ving kapelaan GROENENDIJK in 1960 een prachtig ♀ van de f. *suffusa* te Willemstorp.

Dank zij waarnemingen van LEFFEF weten we nu zeker, dat een deel van de vlinders univoltien is. In juli 1963 werden in de Rivon-vallen in de Peel zeer gave dieren aangetroffen. Deze werden alle weer losgelaten nadat ze eerst gemerkt waren door een hoek uit de achterrand van de rechter voorvleugel te knippen. In de periode van 6—16 oktober 1963 werden drie van deze gemerkte dieren teruggevangen tegelijk met vele andere exemplaren, waarvan zeker 40% verkleurd was, terwijl de rest een veel helderder tint had. In mei 1964 werd weer een gemerkt roesje in de Peel gevangen, dat dus van juli 1963 dateerde! Daarnaast zijn er natuurlijk ook veel exemplaren, die bivoltien zijn en waarvan de vele nazomer-rupsen afstammen, die nog hetzelfde jaar de vlinder leveren. Dit komt dus inderdaad vrijwel overeen met de gang van zaken als bij *Aglais urticae*. Alleen is het merkwaardig, dat de vlinders, die zich niet hetzelfde jaar voortplanten, blijkbaar (althans voor een deel) actief blijven, terwijl die van *A. urticae* al vrij spoedig na het uitkomen in diapauze gaan.

Variable f. *pallidior* Spuler, 1907. Nieuwe vindplaatsen van deze bleke vorm zijn: Denekamp, Hilversum, Weesp, Groede (Zoöl. Mus.); Rhenen (CARON); Den Haag (HARDONK).

f. *suffusa* Tutt, 1892. De vorm zonder een spoor van de roestrode kleur in het achterrandsveld van de voorvleugels is onder het moderne materiaal in elk geval gewoon en komt praktisch overal onder de soort voor. Vaak is ook de rode kleur aan de wortel en in het middenveld gereduceerd, zodat de dieren er dan opvallend donker uitzien.



Fot. J. HUIZENGA

Fig. 52. *Scoliopteryx libatrix* L. Links ♀, Hilversum, 29.IX.1937, e. l.; rechts f. *postnigrescens* nov., ♂, Ruurlo, 24.IX.1965 (holotype).

f. *flavoinspersa* nov. Grondkleur van voor- en achtervleugels dof grijsachtig bruin, bestuiving aan wortel en in middenveld van de voorvleugels niet roodachtig, maar geelachtig. Deventer, ♀, 30.VIII.1952, e. l. (holotype, LUKKIE).

[Ground colour of fore and hind wings dull greyish brown; base and central area of the fore wings not dusted with reddish, but with yellowish.]

f. *postnigrescens* nov. Achtervleugels duidelijk donkerder dan de voorvleugels, zwartachtig, alleen aan de wortel lichter. Zie fig. 52. Ruurlo, ♂, 24.IX.1965, e. l. (holotype, LUKKIE).

[Hind wings distinctly darker than the fore wings, blackish, only the base is paler.]

f. *impuncta* Lempke, 1949. Exemplaren zonder de witte middenstip op de voorvleugels komen weinig voor. Nieuwe vindplaatsen: Weesp (VAN SCHAIK); Nuenen (VERHAAK); Helmond (KNIPPENBERG).

Dwergen. Schalkhaar (LUKKIE); Amsterdamse Bos (PEERDEMAN); Eindhoven (VAN DER WOLF).

Lygephila Billberg

Lygephila pastinum Treitschke. *Tijdschr. Entom.* 90 : 126; Cat. VIII : (536). De in 1949 gegeven verbreiding is correct. De vlinder wordt maar zelden in flink aantal gevangen. Hij is nu van twee der waddeneilanden bekend.

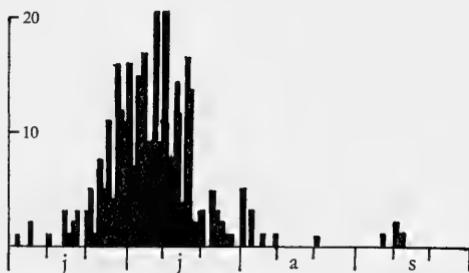


Fig. 53. Histogram van *Lygephila pastinum* Treitschke.

Het hierbij afgebeelde histogram (fig. 53) laat zien, dat de hoofdvliegtijd in de laatste week van juni en in de eerste twee decaden van juli valt. De vroegste vangst is een exemplaar van 3 juni 1901 te Voorschoten (in Zoöl. Mus.). De vliegtijd van de eerste generatie eindigt in de eerste decadie van augustus en de grenzen ervan worden nu: 3.VI—9.VIII. De zeer partiële tweede generatie kan in de derde decadie van augustus en de eerste helft van september vliegen (20.VIII—11.IX, vers dier in 1959 te Montfort door MAASSEN, dus zeker is ook nog een latere datum mogelijk). Alleen in gunstige seisoenen is deze generatie, waarvan de vertegenwoordigers in de regel duidelijk kleiner zijn, te verwachten.

Vindplaatsen. Fr.: Terschelling (Kooibosjes, langs sommige polderdijken, LEFFEF). Dr.: Veenhuizen. Ov.: Ootmarsum, Volthe, Saasveld (Molenven), Markelo, Abdij Sion, Tjoene, Deventer, Olt. Gdl.: Vaassen, Wiessel, Empe, Laag-Soeren; De Voorst, Wientjesvoort, Ruurlo, Hoog-Keppel; Slijk-Ewijk, Heteren. N.H.: Schoorl, Castricum, Bakkum. Z.H.:

Hendrik-Ido-Ambacht (één exemplaar in 1960, BOGAARD), Nieuw-Helvoet, Hellevoetsluis, Ouddorp. Zl.: Burgh, Westenschouwen, Kapelle, Cadzand. N.B.: Bergen op Zoom, Kampina, Boxtel, Best, Nederwetten, Eindhoven, Bergeijk, Helmond, Helenaveen, Sint Anthonis. Lbg.: Griendsveld, Sevenum, Moesel, Panheel, Sint Odiliënberg, Posterholt, Meijnwegen, Montfort, Spaubeek, Heerlerbaan, Hulst, Simpelveld, Eijs, Wijlre, Kunrade, Colmond, Schin op Geul, Heer, Gronsveld, Camerig, Vijlen.

Variabiliteit. f. *pallida* Tutt, 1892. Aalten (VAN GALEN); Hatert, Welterberg, Eijs (VAN WISSELINGH).

f. *ludicra* Haworth, 1809. Vrij gewoon onder de soort.

f. *impuncta* Lempke, 1949. Eveneens vrij gewoon.

f. *confluens* nov. Bovenzijde voorvleugels: de nierzvlek en de zwarte stip op de plaats van de ronde vlek samengesmolten tot één grote wigvormige vlek. Plaat 5 fig. 17. Aalten, ♂, 2.VII.1952 (holotype), plus een tweede uit het ei gekweekt ♂ van 4.VII.1954 en een derde ♂ van 1955 (VAN GALEN). Het feit, dat de vorm op dezelfde plaats in drie verschillende jaren te voorschijn komt, wijst er duidelijk op, dat hij erfelijk is.

[Upper side fore wings: the reniform and the black point in the place of the orbicular united so as to form a single wedge-shaped spot. The form appeared in the same locality in three different years, a clear indication that it is hereditary.]

Dwerg. Agelo (VAN DER MEULEN).

Catephia Ochsenheimer

Catephia alchymista Schiff. *Tijdschr. Entom.* 90 : 126; Cat. VIII : (536). Toen de tekst voor Cat. VIII werd samengesteld, was juist de bloeiperiode voor de soort begonnen, die in de loop van de vijftiger jaren en het allereerste begin van de zestiger jaren zijn hoogtepunt zou bereiken, maar die sinds 1962 (voorlopig?) weer voorbij is. Of deze achteruitgang van tijdelijke aard is, zullen we moeten afwachten. In elk geval worden nu nog slechts enkele exemplaren aangetroffen op dezelfde plaatsen, waar nog maar een paar jaar geleden tientallen gevonden konden worden. Overigens is dit niet zo verwonderlijk voor een soort, die hier de uiterste grens van zijn areaal bereikt en daardoor extra gevoelig zal zijn voor ongunstige factoren, waarbij we wel in de eerste plaats aan het klimaat zullen moeten denken.

Het midden van Limburg is blijkbaar het meest ideale gebied voor de vlinder in ons land, waar het oosten van Noord-Brabant dan goed bij aansluit. In de gunstigste periode reikte zijn areaal tot in Utrecht en Gelderland, maar uit deze provincies zijn al jaren lang geen nieuwe vangsten meer gemeld.

Uit het omringende gebied zijn vrijwel geen nieuwe gegevens bekend geworden, hoewel de bloeiperiode onmogelijk tot Nederland beperkt gebleven kan zijn. Een nog niet vermelde Belgische vindplaats is Lanaeken, vanwaar zich een exemplaar in de collectie-RIJK te Maastricht bevindt.

De vliegtijd kan tot half juli duren. De grenzen zijn nu: 27.IV—15.VII. Bovendien is een enkele maal een exemplaar van een zeer partiële tweede generatie in augustus gevangen: 11.VIII.1953 te Wageningen, augustus 1954 te Sevenum (beide in collectie-VAN DE POL). Dat we hier niet met late exemplaren van de normale generatie te doen hebben, bleek duidelijk uit een eikweek van PIJPERS

in 1960. Alle poppen overwinterden, behalve één, die op 6.VIII de vlinder leverde.

Vindplaatsen. Gdl.: Wageningen, 1953 (VAN DE POL); Zutphen, 1954 (VISSER); Alten, 1950 (VAN GALEN). Utr.: Zeist, 1951, 1960 (GORTER). N.B.: Uden, 1937 (Br. ANTHONIUS); Eindhoven, 1943 (NEIJTS). Lbg.: Arcen, 1953 (S. R. DIJKSTRA); Belfeld, 1950 (Br. ANTHONIUS), 1958—1962 vrijwel alle jaren (diverse verzamelaars, soms gewoon), 1965 slechts twee exemplaren (OTTENHEIJM); Reuver, 1959 (50 stuks! PIJPERS), 1960 (OTTENHEIJM); Beesel, 1958 gewoon, 1959, 1960 (OTTENHEIJM); Sevenum, 1954 (VAN DE POL); Haelen, 1961 (Zoöl. Mus.), Sint Odiliënberg, 1954 (LÜCKER); Posterholt, 1954, 1958, 1960 (LÜCKER); Linne, 1959, vrij talrijk in 1961 (MAASSEN); Montfort, 1959 (ruim 60 stuks! MAASSEN); Echt, 1959 (verschillende verzamelaars, soms gewoon), 1960 (OTTENHEIJM), 1961 (vrij talrijk, MAASSEN), 1962 (OTTENHEIJM); Sint Joost, 1960 (VAN AARTSEN); Stein, 1963 (Missiehuis).

Variabiliteit. Deze is zeer gering. Sommige exemplaren zijn op de voorvleugels wat bonter getekend dan de meerderheid der exemplaren, maar een duidelijke afgrenzing van een bepaalde vorm is niet te geven.

Laspeyria Germar

Laspeyria flexula Schiff. *Tijdschr. Entom.* 90 : 130; *Cat. VIII* : (540). De in *Cat. VIII* gegeven verspreiding is goed. Van diverse plaatsen op de zandgronden wordt de vlinder als gewoon gemeld. In het Hafdistrict is hij tot nog toe vrijwel nergens aangetroffen. Opvallend zijn de vindplaatsen in het Fluviaal District. Ook is *flexula* nu bekend van twee van de waddeneilanden.

De vliegtijd kan wel een week eerder beginnen dan in 1949 bekend was. Ook de laatste datum schuift iets op. De grenzen zijn nu: 6.VI (in 1959 genoteerd door LUCAS) tot 17.VIII (in 1955 te Apeldoorn, SOUTENDIJK). Heel zelden komt toch ook bij ons een exemplaar voor van een zeer partiële tweede generatie. Hier-toe moet een gaaf dier behoord hebben, dat GORTER in de warme zomer van 1947 op 15 september te Zeist ving.

Vindplaatsen. Fr.: Terschelling (vrij gewoon, LEFFEF), Vlieland (CAMPING), Beetsterzwaag, Wijnjeterp, Oosterwolde, Fochtelo, Appelscha, Wolvega, Oudemirdum. Gr.: Glimmen, Noordlaren. Dr.: Roden, Norg, Westervelde, Vries, Schipborg, Zuidlaren, Eext, Schoonlo (zeer gewoon, LEFFEF), Odoorn, Vledder. Ov.: Denekamp, Volthe, Vasse, Reutum, Saasveld (Molenven), Nijverdal, Markelo, Abdij Sion, Frieswijk, Wesepe, Rechteren, Vollenhove. Gdl.: Harderwijk, Hulshorst, Vierhouten, Tongeren, Epe, Heerde, Wiesel, Hoog-Soeren, Assel, Uchelen, Beekbergen, Laag-Soeren, Imbosch, Dabbelo, Hoenderlo, Otterlo, Kootwijk, Garderbroek, Lunteren, Ede; Gorssel, Eefde, Almen, Ruurlo, Woold, Hoog-Keppel, Loerbeek; Berg en Dal, Grootbeek, Geldermalsen. Utr.: Veenendaal, Amersfoort. N.H.: Blaricum, Naardermeer, Schoorl, Bergen, Castricum, Heemskerk, Heemstede, Aerdenhout. Z.H.: Leiden, Oegstgeest, Meijendel, Den Haag, Arkel, Schelluinen, Hendrik-Ido-Ambacht (één exemplaar in 1958), Oostvoorne, Rockanje, Hellevoetsluis, Ouddorp. Zl.: Burgh, Haamstede, Westenschouwen, Oostkapelle. N.B.: Strijbeek, Galder, Dorst, Rovert (Hilvarenbeek), Nieuwkuik, Sint Michielsgestel, Kampina, Boxtel, Best, Oirschot, Vessem, Bergeijk, Schaft, Eindhoven, Nuenen, Valkenswaard, Someren, Deurne, Helenaveen, Sint Anthonis, Gassel. Lbg.: Geijsteren, Sevenum, Griendsveld (zeer talrijk, LEFFEF), Roggel, de Hamert, Velden, Swalmen, Heel, Meijnweg, Vlodrop, Montfort, Stein, Brunssum, Chèvremont, Geulem, Heer, Gronsveld (gewoon, LEFFEF), Mechelen, Epen, Holset, Vijlen.

Variabiliteit. *f. obscura* Lempke, 1949. Niet zeldzaam, van vrij veel vindplaatsen bekend.

f. grisea Lempke, 1949. Gewoon.

f. impuncta Lempke, 1949. De vorm zonder de beide zwarte punten op de voorvleugels is ongetwijfeld een zeldzaamheid. Ik zag geen nieuwe exemplaren ervan, alleen een trans. met nauwelijks zichtbaar stipje van Zeist (GORTER).

f. signata Lempke, 1949. Hetzelfde geldt voor deze vorm: geen nieuwe vangsten.

Dwergen. Aerdenhout (VAN WISSELINGH).

Colobochyla Hübner

Colobochyla salicalis Schiff. *Tijdschr. Entom.* 90 : 131; Cat. VIII : (541). De vlinder is vooral verbreid in het zuiden en midden van Limburg en de oostelijke helft van Noord-Brabant en is daarnaast ook aangetroffen op verschillende plaatsen in Gelderland (vooral in de Achterhoek) en in Twente. In het eerstgenoemde gebied is hij plaatselijk gewoon, zoals uit de recente inventarisaties voor het Rivon door LEFFEF is gebleken. Hij vond de rupsen in de Peel op *Populus tremula*!

In het omringende gebied is *salicalis* nu ook bekend van het Deense eiland Lolland en van enkele plaatsen in Sleeswijk-Holstein en aangrenzend gebied (zie *Mitt. faun. Arb.gemeinsch. Schleswig-Holstein, Hamburg u. Lübeck* N.F. 4 : 52, 1951; 5 : 44, 1952). Vlak over de grens bij Sittard ving CLAASSENS de vlinder in 1954 te Susterseel.

Er is slechts één generatie, die van de tweede helft van mei tot begin augustus kan voorkomen (20.V—1.VIII). De hoofdvliegijd ligt tussen begin juni en de eerste helft van juli, al naar gelang het seizoen.

Vindplaatsen. Ov.: Volthe, 1958 (VAN DER MEULEN); Lemselo, 1945 (KLEINJAN); Saasveld (Molenven), 1957, 1959 (KNOOP, VAN DER MEULEN). Gdl.: Apeldoorn, 1952 (LUCAS); Winterswijk, 1956 (VAN DE POL); Aalten, 1956, 1958 (VAN GALEN); Hoog-Keppel (Ulenpas), 1956 (LEFFEF). N.B.: Boxtel, 1964 (VERHAAK), 1965 (AUKEMA); Best, 1960 (VAN AARTSEN), 1962 (TER LAAG); Nederwetten, 1966 (v. d. WOLF); Nuenen, weer in 1947 en volgende jaren (NEIJTS); Deurne, weer in 1955 en volgende jaren (NIES); Helenaveen, 1962 (LEFFEF). Lbg.: Griendsveld, 1963, 1964, gewoon (LEFFEF); Sevenum, 1963, 1964 (idem); Roggel, 1965 (PEERDEMAN); De Hamert, 1966, gewoon (diverse verzamelaars); Velden, 1965 (OTTENHEIJM); Tegelen, 1963 (idem); Belfeld, 1964 (COX); Swalmen, 1951 en volgende jaren (diverse verzamelaars); Meijnwegen, 1966 (MAASSEN c. s.); Vlodrop (LÜCKER); Stein, 1931, 1963 (Missiehuis); Brunssum, weer in 1937, 1947 en volgende jaren (diverse verzamelaars); Gronsveld, 1960, 1961 in aantal (LEFFEF).

Parascotia Hübner

Parascotia fuliginaria L. *Tijdschr. Entom.* 90 : 127; Cat. VIII : (537). Uit de combinatie van de beide lijsten van vindplaatsen blijkt, dat de vlinder vooral verbreid is in de zandstreken van het oosten en het zuiden van het land. In het Hafdistrict ontbreekt hij vrijwel volkomen, terwijl hij in het Duindistrict slechts zeer plaatselijk is aangetroffen. Opvallend zijn de vondst op één van de waddeneilanden en de vindplaatsen in het westelijk deel van het Fluviaal District. Over het algemeen is het dier vrij schaars.

De vliegtijd kan iets vroeger beginnen dan in 1949 bekend was en voorduren tot eind augustus (26.VIII.1948 te Aalten, VAN GALEN, 28.VIII.1941 te Benne-

kom, VAN DE POL), zodat de uiterste data nu worden: 23.VI (in 1947 te Bennekom, VAN DE POL) tot 28.VIII. Bovendien komen in biezonder gunstige seizoenen soms enkele exemplaren voor, die tot een partiële tweede generatie moeten behoren: 3.IX.1956, vers exemplaar te Aalten (VAN GALEN), 5.IX.1959, vers klein ♂ te Montfort (MAASSEN), 3.X.1956 een exemplaar te Aalten (VAN GALEN).

In *Ent. Ber.* 25: 152 (1965) geeft ELFFERICH een beschrijving van een ab ovo-kweek met foto's van de verschillende stadia. De grote moeilijkheid is het juiste vochtgehalte van de lucht, waarbij de *Polyporus* (of *Polysticcus*, de twee hoofdvoedselplanten) niet mag verschrompelen, maar ook niet mag schimmelen. Een uitvoerig artikel over de biologie (en de verspreiding in Groot-Brittannië) publiceerde H. D. SWAIN in *Ent. Gazette* 1: 186—200 (1950).

Vindplaatsen. Fr.: Terschelling (alleen enkele exemplaren in West, LEFFEF), Boornbergum, Wijnjeterp, Oosterwolde, Fochtelo, Oudemirdum. Dr.: Peize, Eelde, Een, Zuidlaren, Schoonlo (hier gewoon door de vochtige bossen met veel fungi, LEFFEF). Ov.: Denekamp, Volthe, Albergen, Hellendoorn, Raalte, Abdij Sion, Deventer. Gdl.: Garderbroek, Ermelo, Tongeren, Vaassen, Wiessel, Hoog-Soeren, Assel, Beekbergen, Hoenderlo, Wolfheze, Wageningen, Lunteren; Gorssel, Warnsveld, Ruurlo, Neede, Woold, Didam. Utr.: Amerongen, Doorn, Amersfoort, Soesterberg, Hollandse Rading, Botshol. N.H.: 's-Graveland, Bussum, Overveen. Z.H.: Den Haag, Staelduin, Schelluinen, Arkel, Hendrik-Ido-Ambacht (vrij gewoon), Oostvoorne. Zl.: Haamstede, Westenschouwen. N.B.: Bergen op Zoom, Ulvenhout, Dorst, Sint Michielsgestel, Vessel, Best, Acht, Schaft, Nuenen, Aarle-Rixtel, Helenaveen. Lbg.: Griendsveld, Sevenum, Moesel, Swalmen, Sint Odiliënberg, Montfort, Stein, Amsterrade, Schinnen, Brunssum, Heerlerbaan, Klimmen, Valkenburg, Gronsveld (gewoon, LEFFEF), Epen, Vijlen.

Variabiliteit. f. *variegata* Lempke, 1949. Een exemplaar van de bonte vorm met licht achterrandsveld van de voorvleugels werd nog gevangen te Zeist (GORTER). Een fraai bont exemplaar van Aarle-Rixtel (PEERDEMAN) is afgebeeld op plaat 7, fig. 12.

f. *nigra* nov. Zeer donkere vorm: behalve de dwarslijnen en de lichte vlek bij de binnenrandshoek van de achtervleugels ontbreekt alle lichte tekening. Zeist, ♂, 12.VII.1956 (GORTER); Montfort, ♂, 1963 (MAASSEN).

[Very dark form; with the exception of the transverse lines and the pale spot at the anal angle of the hind wings all pale markings are absent.

(ESPER figures a *fuliginaria* with black ground colour under the name of *Geometra carbonaria* ([1799], Schmetterl. in Abb. 5, pl. 32, fig. 3—5) and describes it under the name of *Phalaena Geometra carbonaria* (l. c. 182, [1799]). In both cases the name is preoccupied, so that it cannot be used to designate this dark form).]

Dwergen. Apeldoorn (Zoöl. Mus.); Lunteren (BRANGER); Aalten (VAN GALEN); Amerongen, Slijk-Ewijk (VAN DE POL); 's-Graveland (Mus. Zaandam); Acht (VERHAAK).

Epizeuxis Hübner

Epizeuxis calvaria Schiff. *Tijdschr. Entom.* 90: 132; Cat. VIII: (542). Geen enkele nieuwe vangst, noch in ons land, noch in de omringende gebieden.

Phytometra Haworth

Phytometra viridaria Clerck. *Tijdschr. Entom.* 90 : 128; Cat. VIII : (538). De voedselplant van de rups, de vleugeltjesbloem (*Polygala vulgaris* L.), groeit volgens de flora van HEIMANS, HEINSIUS en THIJSSE in de duinen, op lichte plaatsen in bossen en langs beschaduwde zandwegen en daardoor is de verbreiding van de vlinder in ons land ook tot dergelijke terreinen beperkt. Een enkele Zuid-limburgse vindplaats zou er op kunnen wijzen, dat de rups daar op de alleen in dat gebied voorkomende *Polygala comosa* leeft. Het gewoonst is *viridaria* in de duinen, vooral op enkele der waddeneilanden. Hier is de soort nu alleen nog niet op Texel en Rottum aangetroffen. In het binnenland is hij lokaal en vrij schaars.

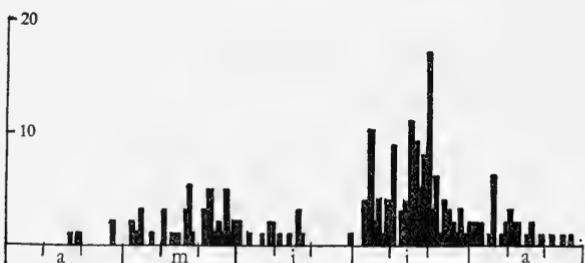


Fig. 54. Histogram van *Phytometra viridaria* Clerck.

De vangdata van alle exemplaren, die ik kon achterhalen, zijn in het histogram (fig. 54) verwerkt. Daaruit blijkt duidelijk, dat de soort twee generaties heeft. De eerste kan al omstreeks half april verschijnen, maar de hoofdvliegijd valt in de tweede en derde decadē van mei met enkele nakomers in de eerste en tweede decadē van juni. De uiterste data ervan zijn nu: 17.IV—17.VI.

De tweede generatie, die gewoner is, begint eind juni te vliegen. De hoofdvliegijd ervan valt in juli en begin augustus en nakomers rekken het soms tot de laatste week van augustus. De uiterste data zijn nu: 30.VI—27.VIII.

Vindplaatsen. Fr.: Schiermonnikoog (VAN MINNEN), Terschelling (talrijk op de Bosplaat in 1957, LEFFEF), Vlieland (CAMPING). Dr.: Veenhuizen, Uffelte, Havelte. Ov.: Almelo. Gdl.: Tongeren, Hoge Veluwe; Ruurlo, Haaksbergen. N.H.: Bergen, Egmond aan Zee, Castricum, Aerdenhout. Z.H.: Katwijk, Oostvoorne, Hellevoetsluis. Zl.: Burgh, Haamstede, Valkenisse, Cadzand. N.B.: Putte, Drunen, Someren. Lbg.: Griendsveld, Sevenum, Swalmen, Montfort, Meerssen.

Variabiliteit. f. *aenea* Hübner, [1803—1808]. Apeldoorn, Egmond aan Zee, Domburg (Zoöl. Mus.).

f. *reducta* Lempke, 1949. Aalten (Zoöl. Mus.); Meijendel, Oostvoorne (LUCAS).

f. *ljungdahli* Nordström, 1940. Niet zeldzaam: Veenhuizen, Epe, Vogelenzang, Putte (Zoöl. Mus.).

f. *fusca* Tutt, 1892. Overal onder de soort.

f. *semipurpurea* Kiefer, 1941. Donderen, Brunssum (VAN WISSELINGH).

Rivula Guenée

Rivula sericealis Scopoli. *Tijdschr. Entom.* 90: 129; Cat. VIII: (539). CAMPING trof de vlinder ook op Vlieland aan, zodat hij nu van drie van de waddeneilanden bekend is. Overigens is niets biezonders over de verspreiding te vermelden.

De vliegtijd kan al aan het begin van de derde decade van mei beginnen. De vroegste datum is nu: 21.V, in 1953 te Bennekom (VAN DE POL). In gunstige herfstten kan de vlinder nog tot in de tweede helft van oktober voorkomen en vliegt dan ongetwijfeld in een partiële derde generatie, daar deze late exemplaren verse dieren zijn. Tweede en derde generatie gaan dan zonder grens in elkaar over, zoals blijkt uit de volgende waarnemingen van LUCAS: 3.X.1959 een afgevlogen exemplaar (laatste datum van de tweede generatie), maar 10.X.1959 een vers dier; ook 3.X.1962. Andere late data zijn: 11.X.1947 te Aerdenhout (VAN WISSELINGH), 13.X.1953 een vers exemplaar te Bennekom (VAN DE POL), 17.X.1959 te Hendrik-Ido-Ambacht (BOGAARD), 20.X.1958 te Stein (slotdatum van de derde generatie, collectie Missiehuis).

Variabiliteit. f. *expressa* Lempke, 1949. De vorm met twee duidelijke dwarslijnen werd nog aangetroffen te: Glimmen, Wageningen, Slijk-Ewijk, Gassel (VAN DE POL); Wiessel, Halfweg, Boxtel (Zoöl. Mus.); Aerdenhout (VAN WISSELINGH); Nederwetten (VAN DER WOLF).

f. *lutea* Lempke, 1949. De vorm met eenkleurig gele voorvleugels, alleen getekend met de donkere middenstip, komt vrij verbreid onder de soort voor, zodat geen vindplaatsen opgesomd behoeven te worden.

f. *limbata* Spuler, 1907. Nieuwe vindplaatsen van exemplaren met verdonkerde achterrond zijn: Apeldoorn, Hilversum, Kortenhoef, Halfweg, Woerdense Verlaat (Zoöl. Mus.); Delfzijl, Hatert, Aerdenhout (VAN WISSELINGH); Oostvoorne (LUCAS). Blijkbaar niet zeldzaam.

f. *signata* Lempke, 1949. Nieuwe vindplaatsen: Amsterdamse Bos, Sint Anthonis (PEERDEMAN).

f. *oenipontana* Hellweger, 1922. Niet al te zeldzaam: Apeldoorn, Eefde, Halfweg, Best (Zoöl. Mus.); Bennekom, Groessen, Horst (VAN DE POL); Aerdenhout, Haarlem (VAN WISSELINGH); Acht (VERHAAK); Rotterdam (VAN DER AA).

HYPENINAE

Herminia Latreille

Herminia barbalis Clerck. *Tijdschr. Entom.* 90: 137; Cat. VIII: (547). Geen nieuwe gegevens over de verspreiding, wat dus ook inhoudt, dat de vlinder nog niet op de waddeneilanden is aangetroffen.

De vliegtijd kan iets eerder beginnen dan in 1949 bekend was en later eindigen. De uiterste data zijn nu: 20.V—14.VII. Op de vroege datum werd in 1919 te Helmond een exemplaar gevangen (collectie-KNIPPENBERG), terwijl de laatste in 1956 door LUCAS genoteerd werd.

Variabiliteit. f. *signata* Lempke, 1949. Opvallend scherp getekende

exemplaren werden nog aangetroffen te: Wiessel (Zoöl. Mus.); Arnhem (VAN WISSELINGH).

f. *demaculata* Lempke, 1949. Exemplaren zonder middencelvlek zijn blijkbaar niet zo zeldzaam. Nieuwe vindplaatsen: Imbosch, Arnhem (VAN WISSELINGH); Nijmegen, Soest, Valkenburg (Zoöl. Mus.).

f. *obsoleta* Lempke, 1949. Zwak getekende exemplaren werden nog bekend van: Apeldoorn, Renkum, Eemnes, Hilversum (Zoöl. Mus.); Harskamp, Hoenderlo (LUCAS); Bennekom (VAN DE POL); Gorssel (WILMINK); Heemstede (LEEFMANS); Aerdenhout, Epen (VAN WISSELINGH); Geulem (Landb. Hschool).

f. *approximata* Lempke, 1949. Exemplaren, waarbij de eerste en de tweede dwarslijn dicht bij elkaar staan, werden aangetroffen te Beetsterzwaag (Landb. Hschool); Arnhem, Nijmegen, Oisterwijk (Zoöl. Mus.); Eindhoven (NEIJTS).

f. *bilineata* nov. Bovenzijde voorvleugels: de golflijn ontbreekt. Eindhoven, ♂, 26.V.1950 (holotype, NEIJTS).

[Upper side fore wings: the submarginal line is absent.]

Dwergen. Winterswijk, Oud-Leusden (Zoöl. Mus.).

Chytolita Grote

Chytolita cribrumalis Hübner. *Tijdschr. Entom.* 90 : 135; Cat. VIII : (545). Wel in hoofdzaak een soort van moerassige plaatsen, onverschillig op welke grondsoort die zich bevinden en daardoor in het Hafdistrict vrijwel beperkt tot de plassengebieden. Op het ogenblik nog slechts van één van de waddeneilanden bekend.

De vliegtijd kan zowel vroeger beginnen als later eindigen dan in 1949 bekend was. De uiterste data zijn nu: 4.VI (in 1959, LUCAS) tot 22.VIII (in 1959 te Glimmen, VAN DE POL).

Vindplaatsen. Fr.: Terschelling (plaatselijk zeer gewoon: Dodemanskisten, Kroonpolders, Kooibosjes, Hoornerkooi, LEFFEF), Ternaard, Eernewoude, Wolvega, Nijetrijne (gewoon, LEFFEF), Oudemirdum. Gr.: Glimmen. Dr.: Zuidlaren, Schoonlo. Ov.: Vriezenveen, Boetelerveld (bij Raalte), Diepenveen, Colmschate, Kalenberg. Gdl.: Teuge, Empe, Klarenbeek (gewoon in het Polveen, LEFFEF), Leuvenheim, Gerritsfles, Kootwijkererveen, Wageningen; Hoog-Keppel, Lobith; Slijk-Ewijk, Buren. Utr.: Zegveld. N.H.: Egmond aan Zee, Heemskerk, Naardermeer, Halfweg, Zaandam, Hoorn, Kennemerduin, Aerdenhout. Z.H.: Meijendel, Staelduin, Asperen, Arkel, Schelluinen, Hendrik-Ido-Ambacht (gewoon geweest, de laatste jaren niet meer), Oostvoorne, Hellevoetsluis, Melissant, Ouddorp. Zl.: Burgh, Haamstede, Westenschouwen, Oostkapelle, Zoutelande, Valkenisse, Sloedam, Cadzand. N.B.: Sint Michielsgestel, Kampina, Best, Valkenswaard, Helenaveen, Gassel. Lbg.: Griendsveld (gewoon, LEFFEF), Sevenum, Moesel, Tegelen, Swalmen, Montfort, Gronsveld, Vijlen.

Variabiliteit. f. *nigrostriata* Urbahn, 1939. Hendrik-Ido-Ambacht (LUCAS).

f. *tangens* Lempke, 1949. Een nieuwe vindplaats van deze zeldzame vorm is Valkenisse (VAN AARTSEN leg., Zoöl. Mus.).

f. *reducta* Lempke, 1949. Exemplaren zonder de rij streepjes op de plaats van de tweede dwarslijn werden nog aangetroffen te: Kortenhoef (Zoöl. Mus.); Wassenaar (VAN WISSELINGH).

f. modestalis Boldt, 1928. Exemplaren, waarbij op de voorvleugels alleen de middenstip aanwezig is, werden nog gevangen op Terschelling (VAN WISSELINGH) en te Hendrik-Ido-Ambacht (BOGAARD).

f. grisescens Lempke, 1949. Nieuwe vindplaatsen van de vorm met grijssachtige grondkleur zijn: Terschelling (VAN WISSELINGH); Malden, Zoutelande, Valkenisse, Cadzand (Zoöl. Mus.); Kampina, Deurne (LUCAS). Blijkbaar vrij gewoon.

f. postmaculata nov. Bovenzijde achtervleugels: voor de achterrand een doorlopende rij donkere vlekken. Aerdenhout, ♂, 9.VII.1959 (holotype), Wassenaar, ♂, 1939 (VAN WISSELINGH).

[Upper side hind wings: a subterminal continuous row of dark spots.]

Dwerg. Heemstede (VAN DE POL).

Zanclognatha Lederer

Zanclognatha tarsipennalis Treitschke. *Tijdschr. Entom.* 90: 133; Cat. VIII: (543). De in 1949 aangegeven verbreiding is wel goed. Er zijn nu wat meer vindplaatsen in het lage deel van het land bekend geworden, maar de vlinder is hier toch niet zo verbreid als op de zandgronden. Hij is nu van twee der waddeneilanden bekend.

De eerste generatie kan al in de tweede helft van mei beginnen te vliegen. De grenzen ervan worden nu: 19.V (in 1952 te Bennekom waargenomen, VAN DE POL) tot 11.VIII. Geen correctie op de vliegtijd van de tweede generatie.

Vindplaatsen. Fr.: Terschelling, Vlieland, Sexbierum, Leeuwarden, Wijnschoter, Oosterwolde, Nijetrijne, Oudemirdum, Rijs, Tjerkwerd. Gr.: Delfzijl, Slochteren, Veendam. Dr.: Roden, Westervelde, Veenhuizen, Schipborg, Zuidlaren, Eext, Grollo, Wijster, Kralo, Vledder. Ov.: Denekamp, Volthe, Albergen, Saasveld (Molenen), Nijverdal, Balkbrug, Rechteren, Dalfsen, Raalte, Abdij Sion, Colmschate. Gdl.: Garderbroek, Kootwijk, Hoenderlo, Heerde, Wiessel, Hoog-Soeren, Assel, Teuge, Uchelen, Beekbergen, Empe, Laag-Soeren, Wageningen, Lunteren; Eefde, Verwolde, Ruurlo, Vorden, Aalten; Slijk-Ewijk. Utr.: Utrecht, Botshol. N.H.: Weesp, Diemen, Halfweg, Zaandam, Beemster, Oosthuizen, Hoorn, Schoorl, Heemskerk, Heemstede, Aerdenhout. Z.H.: Noorden, Katwijk, Wassenaar, Vreeswijk, Leidschendam, Den Haag, Staelduin, Rotterdam, Arkel, Hendrik-Ido-Ambacht, Oostvoorne, Hellevoetsluis, Middelharnis, Ouddorp. Zl.: Burgh, Haamstede, Westenschouwen, Oostkapelle, Valkenisse, Goes, Cadzand. N.B.: Waalwijk, Udenhout, Sint Michiels-gestel, Oirschot, Vesse, Geldrop, Valkenswaard, Heeze, Helmond, Helenaveen. Lbg.: Griendsveld, Sevenum, Moesel, Roggel, de Hamert, Baarlo, Swalm, Meijweg, Stein, Heerlerbaan, Chèvremont, Kerkrade, Bunde, Gronsveld, Epen, Vijlen, Vaals.

Variabiliteit. *f. obscura* Lempke, 1949. Vooral bij het ♀ gewoon.

f. latelineata nov. Bovenzijde voorvleugels: de eerste en de tweede dwarslijn duidelijk verbreed. Stein, ♂, 18.VI.1961 (holotype, collectie-Missiehuis).

[Upper side fore wings: antemedian and postmedian distinctly broadened.]

f. delineata Lempke, 1949. Exemplaren zonder de eerste en tweede dwarslijn zijn zeldzaamheden. Nieuwe vindplaatsen: Apeldoorn (Zoöl. Mus.); Amsterdam (PEERDEMAN); Nuenen (NEIJTS).

f. bidentalis Heinemann, 1859. De vorm blijkt helemaal niet zo zeldzaam te zijn als ik in 1949 dacht. Nieuwe vindplaatsen: Putten, Hilversum, Amsterdam, Halfweg, Den Haag (Zoöl. Mus.).

Dwergen. Apeldoorn, Bussum, Rotterdam, Breda (Zoöl. Mus.).

Zanclognatha lunalis Scopoli, 1763 (*tarsiplumalis* Hübner, [1796]). *Tijdschr. Entom.* 90 : 132; Cat. VIII : (542). De vlinder behoort zonder twijfel tot onze lokale soorten, wat wel heel duidelijk gedemonstreerd wordt door het geringe aantal nieuwe vindplaatsen. Behalve op de zandgronden komt hij ook in het Krijtdistrict voor, maar dan toch wel bij voorkeur in bosachtig terrein.

Ons land ligt in het grensgebied van het areaal. Uit Denemarken is slechts één ♀ bekend, dat in 1946 op Falster gevangen werd. In het noordwesten van Duitsland en op de Britse eilanden komt de soort niet voor.

Een zeer kleine correctie op de vliegtijd, waarvan de uiterste data nu worden: 3.VI—13.VIII.

Vindplaatsen. Fr.: Leeuwarden, Ternaar, Beetsterzwaag, Wolvega. Ov.: Volthe, Rectum. Gdl.: Wiessel. Utr.: Amerongen, Maarsseveen. N.H.: Aerdenhout. Z.H.: Oegstgeest, Den Haag. Zl.:burgh, Haamstede, Westenschouwen. Lbg.: Sevenum, Epen, Vijlen.

Variabiliteit. f. *brunnescens* Lempke, 1949. De lichtere vorm met bruinere grondkleur werd nog aangetroffen te: Apeldoorn, Bentveld, Aerdenhout (VAN WISSELINGH).

Zanclognatha tarsicrinialis Knoch. *Tijdschr. Entom.* 90 : 133; Cat. VIII : (543). De in 1949 gegeven verbreiding is goed. Uit de combinatie van beide lijsten van vindplaatsen blijkt duidelijk, dat de soort het meest verbreid is in het zuiden en midden van Limburg. Meer noordelijk wordt hij steeds zeldzamer, hoewel hij nu toch ook uit Friesland en Drente bekend geworden is. In het Duindistrict komt de vlinder blijkbaar slechts zeer spaarzaam voor. De vindplaats Hilversum moet vervallen (onjuiste determinatie).

Ons land ligt aan de noordgrens van het areaal. Pas in 1918 werd de soort voor het eerst in Denemarken gevonden. Hij is er nu bekend van Lolland, Falster, Møn en Bornholm. Eerst na de Tweede Wereldoorlog werd *tarsicrinialis* in Holstein, bij Hamburg en in Oldenburg aangetroffen, terwijl in 1965 voor het eerst een exemplaar op de Britse eilanden werd gevangen, nl. in Suffolk (zie E. C. PELHAM-CLINTON, *Ent. Gazette* 17 : 3—5, plaat 1 fig. 1, 1966).

De vliegtijd kan reeds eind mei beginnen en wordt nu: 30.V (in 1946 te Agelo, KNOOP) tot 5.VIII.

Vindplaatsen. Fr.: Beetsterzwaag. Dr.: Eext. Ov.: Denekamp, Volthe, Agelo, Reutum, Weerselo, Saasveld (Molenven), Colmschate. Gdl.: Bennekom; Eefde, Ratum, Aalten. N.H.: Overveen. Zl.: Oostkapelle. N.B.: Bergen op Zoom, Chaam, Oosterhout, Sint Michiels-gestel, Haaren, Best, Acht, Eindhoven, Nederwetten, Nuenen, Valkenswaard, Someren. Lbg.: Geijsteren, Moesel, Tegelen, Steijl, Swalmen, Maalbroek, Meijnweg, Montfort, Stein, Amstelrade, Schinveld, Heerlerbaan, Chèvremont, Geulem, Berg, Bunde, Kannerbos, Gronsveld, Vijlen.

Variabiliteit. f. *obscura* nov. Grondkleur van de voorvleugels donker-grijs. Ratum, ♂, 1962 (PEERDEMAN); Gronsveld, ♀, 23.VI.1936 (holotype, VAN WISSELINGH).

[Ground colour of the fore wings dark grey.]

f. *diluta* Lempke, 1949. Deze lichte vorm werd nog bekend van Hatert (VAN WISSELINGH).

Zanclognatha grisealis Schiff. *Tijdschr. Entom.* 90 : 134; Cat. VIII : (544). In het Waddendistrict is de vlinder nu bekend geworden van Terschelling (enkele exemplaren, LEFFEF). Ook werd hij nog op een paar plaatsen buiten de zandgronden aangetroffen: Sexbierum (STOBBE, 1963 en 1964, mogelijk zwervers van Terschelling), Heteren en Melissant (HUISMAN), Amsterdamse Bos (Zool. Mus.), Woerdense Verlaat (1960, VAN AARTSEN), Leiden (LUCAS), Rotterdam (Kralingerhout, VAN DER AA), Bolnes (gewoon!), Hendrik-Ido-Ambacht (BOGAARD).

De eerste generatie kan iets vroeger beginnen te vliegen dan in 1949 bekend was: 17.V (in 1959 genoteerd door LUCAS), terwijl de tweede tot in oktober kan doorvliegen (7.X.1962, VAN AARTSEN, ook 3.X.1962, LUCAS). LEFFEF heeft deze tweede generatie geregeld van 1951 tot 1958 te Apeldoorn en Wiessel waargenomen. Gemiddeld zijn de exemplaren ervan kleiner dan die van de eerste.

Variabiliteit. f. *clara* Lempke, 1949. Deze lichtere vorm komt wel op de meeste plaatsen onder de soort voor, maar is niet gewoon.

f. *albescens* nov. Grondkleur van lichaam en vleugels witgrijs. Zeist, ♀, juli 1939 (holotype, GORTER).

[Ground colour of body and wings whitish-grey.]

f. *obscura* nov. Voorvleugels opvallend verdonkerd: donker bruin-grijs tot zwartgrijs, ook de achtervleugels en het lichaam donkerder dan bij typische exemplaren. Alleen onder modern materiaal aangetroffen, zowel bij het ♂ als bij het ♀. Eext, Amsterdamse Bos, Geulem, Vijlen (Zool. Mus.); Ruurlo (LUKKIEN); Bergeijk (VAN WISSELINGH); Deurne (NIES); Heerlerbaan (LUKKIEN).

Holotype: ♂ van Vijlen, 24.VI.1962, in de collectie van het Zool. Mus.

[Fore wings strikingly darkened: dark brown-grey to black-grey, hind wings and body also darker than with typical specimens. In both sexes, but only with modern material.]

Dwerg. Valkenisse (Zool. Mus.).

Trisateles Tams

Trisateles emortualis Schiff. *Tijdschr. Entom.* 90 : 132; Cat. VIII : (542). De vlinder komt in hoofdzaak op de zandgronden en in het Krijtdistrict voor, vooral in bosachtig terrein. Hij is nu ook van twee van de waddeneilanden bekend. Plaatselijk kan hij gewoon zijn, wat vooral gebleken is door het faunistische onderzoek van het Rivon, waarvan LEFFEF mij de resultaten mededeelde. Opmerkingen achter sommige vindplaatsen over de mate van voorkomen zonder verdere aanduiding zijn van hem afkomstig. De vangst op de ene plaats in het Fluviatiel District zal wel van een zwerver geweest zijn.

Merkwaardig is de sterke achteruitgang van de soort in Groot-Brittannië. De laatste vangst dateerde daar uit 1859. Pas in 1962 werden weer vijf exemplaren in Buckinghamshire gevangen (*Proc. Trans. South London ent. nat. Hist. Soc.* 1962 : 35, 1963).

De laatste zekere datum van de eerste generatie is nu 21.VII (in 1958, Missiehuis Stein), die van de tweede 7.IX (LEFFEF), terwijl een exceptioneel laat exemplaar op 4 oktober 1950 te Brunssum werd gevangen (DELNOYE). De vliegtijden worden nu dus: generatie I van 18.V—21.VII en generatie II van 23.VII—4.X.

Vindplaatsen. Fr.: Schiermonnikoog (STOBBE), Terschelling (RIVON), Beetsterzwaag, Oosterwolde, Oudemirdum. Dr.: Eext, Schoonlo (zeer veel). Ov.: Denekamp, Saasveld (Molenven), Ommen, Abdij Sion, Frieswijk, Deventer, Olst. Gdl.: Hulshorst, Epe, Wiessel, Hoog-Soeren (gewoon, ook op smeer), Assel, Teuge (enkele), Uchelen, De Steeg, Hoenderlo (zeer gewoon) Harskamp, Kootwijk, Kootwijkerveen, Lunteren; Bekendelle, Hoog-Keppel, Loerbeek, Berg en Dal. Utr.: Amerongen, Bilthoven. N.H.: 's-Graveland, Schoorl, Overveen (gewoon), Heemstede. Z.H.: Hendrik-Ido-Ambacht (1963 en 1964 telkens één exemplaar, BOGAARD). Zl.: Haamstede, Westenschouwen, Oostkapelle. N.B.: Bergen op Zoom, Wouw, Strijbeek, Eindhoven, Nuenen. Lbg.: Griendsveld (zeer veel), Sevenum, Arcen, Tegelen, Swalmen, Stein, Brunssum, Chèvremont, Eijs, Cadier, Kannerbos, Gronsveld (vrij veel), Eperheide, Epen, Bissen, Vijlen (vrij veel), Vaals.

Variabiliteit. Dwerg. Eperheide (Zoöl. Mus.). Bovendien zijn de exemplaren van de (partiële) tweede generatie over het algemeen wat kleiner dan die van de eerste, zonder evenwel echte dwergen te worden.

Paracolax Hübner

Paracolax derivalis Hübner. *Tijdschr. Entom.* 90 : 136; Cat. VIII : (546). Slechts een enkele vangst, blijkbaar van een zwerver, is bekend geworden buiten de in 1949 aangegeven biotopen. De vlinder is nu aangetroffen op twee van de waddeneilanden.

De vliegtijd kan tot eind augustus duren. De grenzen ervan worden nu: 16.VI—28.VIII. De laatste datum werd in 1955 te Epen genoteerd door VAN WISSELINGH.

Vindplaatsen. Fr.: Terschelling, Vlieland, Eernewoude, Duurswoude, Wijnjeterp, Oosterwolde, Fochtelo, Appelscha, Wolvega, Nijemirdum. Gr.: Sellingerbeetse. Dr.: Westervelde, Veenhuizen, Schoonlo, Odoorn, Hooghalen, Wijster, Havelte. Ov.: Volthe, Saasveld (Molenven), Almelo, Nijverdal, Holten, Abdij Sion, Frieswijk, Colmschate, Deventer. Gdl.: Garderbroek, Ermelo, Harderwijk, Hulshorst, Nunspeet, Vierhouten, Wezep, Tongeren, Epe, Heerde, Wiessel, Beekbergen, Eerbeek, Kemperberg, Otterlo, Wageningen, Bennekom; Gorssel, Eefde, Harfsen, Ruurlo, Vorden, Loerbeek, Aerdt, Ubbergen, Slijk-Ewijk. Utr.: Grebbe, Utrecht, Zeist, Bilthoven, Soesterberg. N.H.: Blaricum, Huizen, Middelie (een afgevlogen exemplaar in 1949, DE BOER), Groot, Schoorl, Bakkum, Heemskerk, Heemstede. Z.H.: Leiden, Meijendel, Oostvoorne. Zl.: Oostkapelle, Domburg, Goes. N.B.: Dorst, Vught, Sint Michielsgestel, Best, Oirschot, Eindhoven, Someren, Sint Anthonis, Mill. Lbg.: Milsbeek, Arcen, Geijsteren, Sevenum, Griendsveld, Baarlo, Swalmen, Schurenberg, Kannerbos, Rijckholt, Epen, Vijlen.

Variabiliteit. f. *delicata* Dannehl, 1925. Nieuwe vindplaatsen van deze lichte vorm zonder donkere bestuiving op de vleugels zijn: Milligen, Aerdenhout, Zandvoort, Epen (VAN WISSELINGH); Oostkapelle (Zoöl. Mus.).

f. *suffusa* Lempke, 1949. Als in 1949 aangegeven.

f. *latelineata* Lempke, 1949. Exemplaren met opvallend verdikte dwarslijnen (niet zelden alleen de tweede) werden nog aangetroffen te: Zeist (GORTER); Overveen (VAN WISSELINGH); Heemstede (VAN DE POL); Wassenaar (Zoöl. Mus.); Geijsteren (NEIJTS); Swalmen (LÜCKER); Roggel (PEERDEMAN); Epen (BERGMAN). Blijkbaar niet zeldzaam.

f. *fangalis* Dannehl, 1925. De vorm met de rij donkere vlekken voor de achterrand van de voorvleugels werd nog aangetroffen te: Ruurlo (LUKKIEN); Zeist (GORTER); Wageningen (VAN DE POL); Den Haag (Landb. Hschool).

f. *signata* Lempke, 1949. Nieuwe vindplaats van de vorm met duidelijke donker afgezette golflijn: Hoenderlo (LUCAS).

f. *obsoleta* Lempke, 1949. De vorm met vrijwel verdwenen middencelvlek op de bovenzijde van de voorvleugels is minder zeldzaam. Nieuwe vindplaatsen: Colmschate, Tongeren, Otterlo, Soest, Oostkapelle (Zool. Mus.); Leuvenum (Landb. Hschool); Oostvoorne (LUCAS); Epen (VAN WISSELINGH).

f. *unilineata* Lempke, 1949. Otterlo (Zool. Mus.); Geijsteren (VERHAAK).

f. *delineata* Lempke, 1949. Geen nieuwe vindplaatsen, blijkbaar een rariteit.

Bomolocha Hübner

Bomolocha crassalis Fabricius. *Tijdschr. Entom.* 90 : 138; Cat. VIII : (548).

Van de nieuwe vindplaatsen zijn vooral de twee in het Noordhollandse duingebied een verrassing. Zij kwamen te voorschijn bij het faunistische onderzoek door het Rivon (opgaven van LEFFEF). *Vaccinium*, de voedselplant van de rups, komt bij Schoorl voor, maar niet bij Overveen (mededeling van Dr. G. KRUSEMAN). Op de eerstgenoemde vindplaats kan de vlinder dus inheems zijn, maar die van Overveen zal wel een zwerver zijn. Opvallend is ook de vangst in twee opeenvolgende jaren op Terschelling. Hier groeit *Vaccinium* genoeg, maar de vindplaats ligt wel erg excentrisch. Het voornaamste biotoop wordt gevormd door groeiplaatsen van bosbes onder grote den (LEFFEF).

De vliegtijd kan tot ver in de tweede helft van augustus duren en wordt nu: 27.V—23.VIII. Op de late augustus-datum werd in 1952 door S. R. DIJKSTRA nog een exemplaar bij Voorst gevangen. Ik zelf ving op 18 en 22.VIII.1955 te Wiessel enkele afgevlogen exemplaren.

V i n d p l a a t s e n. Fr.: Terschelling (in 1956 en 1957 te West-Terschelling, LEFFEF), Beetsterzwaag. Gr.: Noordlaren. Dr.: Roden, Westervelde, Norg, Eelde, Vries, Schoonlo. Ov.: Albergen, Saasveld (Molenven), Tusveld, Abdij Sion, Colmschate, Wesepe. Gdl.: Garderen, Elspeet, Uddel, Nieuw-Milligen, Vierhouten, Soerel, Tongeren, Wiesel, Doornspijk, Oldebroek, Heerde, Epe, Gortel, Nierssen, Wiesel, Hoog-Soeren, Assel, Uchelen, Beekbergen, Loenen, Eerbeek, Arnhem, Terlet, Schaarsbergen, Woeste Hoeve, Hoenderlo, Hoge Veluwe, Kootwijk, Harskamp; Ruurlo, Winterswijk. Utr.: Doorn, Austerlitz, Soestduinen. N.H.: Bussum, Schoorl, Overveen (zie bij de algemene opmerkingen over de verspreiding). N.B.: Boxtel, Kampina, Middelbeers, Eindhoven, Maarheeze. Lbg.: Sevenum, Roggel, Steijl, Swalmen, Sint Odiliënberg, Posterholt, Stein, Aalbeek, Heerlen, Imstenrader Bos, Vijlen, Vaals.

V a r i a b i l i t e i t. f. *terrificulalis* Hübner, [1811—1813]. Vrijwel overal onder de soort, zodat geen vindplaatsen meer opgesomd worden.

f. *achatalis* Hübner, 1790. Dezelfde opmerking als bij de vorige vorm.

Hypena Schrank

Hypena rostralis L. *Tijdschr. Entom.* 90 : 140; Cat. VIII : (550). Behalve op Texel en Schiermonnikoog is de vlinder nu ook tijdens het Rivononderzoek in 1956 op Terschelling aangetroffen (LEFFEF). Overigens is de in 1949 aangegeven verspreiding wel juist, maar het is wel de ervaring van vrijwel alle verzamelaars, dat het dier beslist niet talrijk te noemen is. Dit blijkt ook wel hieruit, dat ik na

1949 betrekkelijk weinig nieuw materiaal gezien heb. Opvallend is de vindplaats Hendrik-Ido-Ambacht, waar in 1956 en 1958 telkens één exemplaar werd gevangen (BOGAARD).

Geen correctie op de aangegeven vliegtijd.

Variabiliteit. f. *vittatus* Haworth, 1809. De vorm komt vrijwel overal onder de soort voor, zodat geen vindplaatsen meer opgegeven worden.

f. *vittata-variegata* Lempke, 1949. Als de vorige vorm.

f. *brunnea* Lempke, 1949. Nieuwe vindplaatsen: Paterswolde, Hatert, Wassenaar (VAN WISSELINGH).

f. *brunnea-variegata* Lempke, 1949. Nieuwe vindplaatsen: Wassenaar, Bergeijk (VAN WISSELINGH).

f. *spectans* Dannehl, 1926. Nieuwe vindplaatsen: Wiessel (Zoöl. Mus.); Haarlem, Wassenaar (VAN WISSELINGH).

f. *radiatalis* Hübner, [1796]. Nieuwe vindplaatsen: Leuvenum (Landbouw Hogeschool); Hilversum (Zoöl. Mus.); Heemstede (VON HERWARTH); Bergeijk (VAN WISSELINGH); Nuenen (NEIJTS).

f. *radiatalis-variegata* Lempke, 1949. Bolsward, Colmschate, Nijkerk, Den Haag (Zoöl. Mus.); Almelo (KLEINJAN); Leuvenum (Landbouw Hogeschool); Aardenhout (VAN WISSELINGH); Scheveningen (VAN DER WEELE); Nuenen (VERHAAK).

Dwerg. Arnhem (Zoöl. Mus.).

Teratologisch exemplaar. Linker vleugels te klein. Hollandse Rading (Zoöl. Mus.).

Hypena obesalis Treitschke. Van deze vlinder, die in 1963 voor het eerst in ons land werd aangetroffen, zijn nu twee in Nederland gevangen exemplaren bekend. Ongetwijfeld hebben we met een overigens op onze breedte zeldzame immigrant te doen, vrij zeker uit zuidelijker gebieden.

Uit Denemarken is één exemplaar bekend, dat in 1911 op het eiland Mors (in de Limfjord, ten noorden van Jutland) werd gevangen. Geen enkele melding uit het omringende Duitse gebied. Evenmin uit België. (In Frankrijk van de Basses Alpes in het zuiden tot de Vogezen, hoofdzakelijk in bergstreken. Cf. LHOMME, Cat. Lép. France et Belgique : 336—337). Eén exemplaar in 1908 in het zuiden van Engeland.

Het ene exemplaar werd begin juni, het andere in de tweede helft van augustus gevangen.

Vindplaatsen. Ov.: Abdij Sion, begin juli 1963 (Pater AMADEUS ALMA). Z.H.: Oostvoorne, 23.VIII.1964 (VAN DER MADE c.s.).

Hypena proboscidalis L. *Tijdschr. Entom.* 90 : 139; Cat. VIII : (549). De vlinder is nu ook bekend van Terschelling en Vlieland, zodat alleen Ameland en Rottum nog in de rij van de waddeneilanden ontbreken. Overigens is de in 1949 gegeven verbreiding correct.

De eerste generatie wordt omstreeks half juli nog slechts sporadisch waargenomen. De enige waarneming, behalve de twee in 1949 vermelde data 10.VII en 17.VII, is 9.VII.1959 (LUCAS). De tweede generatie kan tot ver in oktober vliegen,

zoals blijkt uit de volgende data: 13.X.1953 (KNIPPENBERG), 14.X.1962 (LUCAS) en 18.X.1962 (LEFFEF).

Varia**bil**abilit**eit**. f. *bilineata* Lempke, 1949 (*brunnea-bilineata* Lempke, 1949). Exemplaren zonder golflijn op de voorvleugels zijn niet zeldzaam. Als vrijwel altijd heeft de tekening geen relatie met de grondkleur, zodat het niet nodig is de diverse mogelijkheden door aparte namen te onderscheiden. Nieuwe vindplaatsen zijn: Vollenhove (WINTERS); Apeldoorn, Wiessel, De Steeg, Nijmegen, Muiden, Weesp (Zoöl. Mus.); Middelie (DE BOER); Vogelenzang (VAN WISSELINGH); Oegstgeest (KAIJADOE); Kerkrade (LUCAS).

f. *obsoleta* Lempke, 1949. Apeldoorn, Soest, Muiden, Weesp (Zoöl. Mus.); Zeist (GORTER); Amsterdamse Bos (PEERDEMAN); Nuenen (VERHAAK).

f. *infuscata* Spuler, 1908. Deze donkere vorm blijkt nu vrij gewoon te zijn, zodat het zelfs overbodig is er vindplaatsen van te vermelden.

Dwergen. Noordlaren, Heemstede (VAN DE POL); Hendrik-Ido-Ambacht (een extreem klein exemplaar, BOGAARD).

Schrankia Hübner

Schrankia taenialis Hübner. *Tijdschr. Entom.* 90 : 143; Cat. VIII : (553). De vlinder blijft tot nog toe een lokale soort, die nog steeds niet uit het westen van het land bekend is. Ongetwijfeld zal hij net als de beide volgende soorten vaak voor een micro aangezien worden, zodat hij in werkelijkheid wel minder zeldzaam zal zijn dan lijkt.

De eerste generatie verschijnt al in juni. De vroegste datum is nu 8.VI (in 1964 te Ommen, BENTINCK), terwijl de laatste zekere datum 2.VIII is (in 1954 te Eperheide, VAN WISSELINGH). De hoofdvliegtijd is in elk geval de maand juli. Mogelijk begint de tweede generatie reeds half augustus te vliegen. Het is tenminste te betwijfelen, of een exemplaar van 18.VIII (in 1964 te Ommen, BENTINCK) nog tot de eerste generatie behoort.

Vindplaatsen. Ov.: Ommen (1964, BENTINCK), Volthe (1943, VAN DER MEULEN, blijkens de vele notities in de cartotheek van KNOOP hier niet zeldzaam). Utr.: Amerongen (1964, BENTINCK); Botshol (WOLSCHRIJN). Lbg.: Sevenum (1964, enkele exemplaren tijdens de Rivon-inventarisatie, LEFFEF); Bunde (1964, LUCAS); Eperheide („bepaald niet zeldzaam, vooral in de eerste helft van juli op stroop”, VAN WISSELINGH); Epen (1952, BENTINCK, 1957, LUCAS).

f. *obscura* nov. Grondkleur van de voorvleugels zwartgrijs, die van de achtervleugels donkergrijs. Epen, ♀, 16.VII.1964 (holotype, VAN WISSELINGH).

[Ground colour of the fore wings black-grey, that of the hind wings dark-grey.]

f. *virgata* nov. Bovenzijde voorvleugels: middenveld donker, wortel- en achterrandsveld licht. Epen, ♂, 12.VII.1964 (holotype, VAN WISSELINGH).

[Upper side fore wings: central area dark, basal and outer areas pale.]

Schrankia costaestrigalis Stephens. *Tijdschr. Entom.* 90 : 144; Cat. VIII : (554). In elk geval veel verbreider dan de vorige soort, mogelijk op de meeste moerassige terreinen te verwachten; plaatselijk zeer gewoon en zelfs van een van de waddeneilanden bekend.

De eerste generatie kan vroeger beginnen te vliegen en later voorkomen dan in 1949 bekend was. De uiterste data ervan zijn nu: 26.V—14.VII. Geen correctie op de vliegtijd van de tweede generatie.

Vindplaatsen. Fr.: Terschelling, Eernewoude, Olterterp, Nijetrijne (blijkens het Rivon-onderzoek zeer gewoon, LEFFEF). Gdl.: Aalten, Utr.: Amerongen, Botshol. N.H.: Kortenhoef, Amsterdamse Bos (weinig, maar geregeld, PEERDEMAN), Halfweg, Aerdenhout. Z.H.: Woerdense Verlaat, Oostvoorne, Melissant. N.B.: Bergeijk, Deurne. Lbg.: Plasmolen, Arcen, Tegelen, Griendseveen (gewoon, LEFFEF), Sevenum, Moesel, Roggel, Stein, Eperheide.

f. monotona Lempke, 1949. Eperheide (VAN WISSELINGH).

f. unicolor Lempke, 1949. Hollandse Rading (Zoöl. Mus.).

f. virgata nov. Bovenzijde voorvleugels: middenveld donker, wortel- en achterrandsveld licht. Epen, ♂, 10.VII.1950 (holotype, VAN WISSELINGH).

[Upper side fore wings: central area dark, basal and outer areas pale.]

Tholomiges Lederer

Tholomiges turfosalis Wocke. *Tijdschr. Entom.* 90 : 145; Cat. VIII : (555). Slechts enkele nieuwe vindplaatsen kunnen aan de in 1949 vermelde toegevoegd worden, die een kleine uitbreiding van het in ons land bekende areaal betekenen.

De vlinder kan tot in oktober vliegen. De laatste datum wordt nu: 6.X (in 1964, VAN AARTSEN), zodat er ongetwijfeld twee generaties kunnen voorkomen. De grens ertussen is echter op het ogenblik nog moeilijk aan te geven door te weinig gegevens.

Vindplaatsen. Fr.: Eernewoude (1955, CAMPING); Nijetrijne (1959, G. DIJKSTRA en CAMPING). Z.H.: Woerdense Verlaat (1959, VAN AARTSEN, in Zoöl. Mus.). N.B.: Kampina (LUCAS); Valkenswaard (1966, VAN DER WOLF); Geldrop (1958, HAANSTRA); Heleenaveen (1953, 1958, NIES). Lbg.: Stein (1964, VAN AARTSEN).

Variabiliteit. *f. obscura* Lempke, 1949. Deze eenkleurig donkere vorm werd nog aangetroffen te Woerdense Verlaat (Zoöl. Mus.); Plasmolen (LUCAS).

f. lacticolor nov. Voor- en achtervleugels eenkleurig witachtig, van de tekening is alleen de middenstip van de voorvleugels vrij duidelijk zichtbaar. „Friesland”, Kortenhoef, Plasmolen (Zoöl. Mus.).

Holotype: ♂ van Plasmolen, 13.VII.1922, in genoemde collectie.

[Fore and hind wings unicolorous whitish, of the markings only the central spot of the fore wings is rather distinctly visible.]

f. bicolor Lempke, 1949. Geen nieuwe gegevens.

CORRIGENDA

Supplement I

p. (24), regel 7 van boven: *Graphium* moet zijn *Iphiclides*.
 regel 8 van boven: *Graphium podalirius* moet zijn: *Iphiclides podalirius*. Cf. MUNROE, E., 1960, The classification of the Papilionidae: 18 (Canad. Ent., suppl. 17).

Supplement VI

p. (324), regel 14 van onderen: *Celerio* Oken moet zijn: *Spectrum* Scopoli. Cf. FLETCHER, D. S., 1966, Ent. Gazette 17: 16.
 regel 15 van onderen: *Celerio euphorbiae* moet zijn: *Spectrum euphorbiae*.
 p. (325), regel 8 van onderen: *Celerio galii* Schiff. moet zijn: *Spectrum gallii* von Rottemburg.
 p. (327), regel 8 van boven: *Celerio livornica* moet zijn: *Spectrum livornica*.

Supplement VII

p. (424), regel 4 van onderen: *asiatica* Bang Haas is zelfs geen subspecies van *Cilix glaucata*, maar een goede soort. Zie DANIEL, F., 1963, Z. Wiener ent. Ges. 48: 151.

Supplement VIII

p. (502), regel 2 van onderen: *Procris* Fabricius moet zijn: *Adscita* Retzius. Cf. FLETCHER, D. S., 1966, Ent. Gazette 17: 9.
 Regel 1 van onderen: *Procris statices* moet zijn *Adscita statices*.
 p. (515), regel 14 van boven: *Sciapteron* Staudinger moet zijn *Paranthrene* Hübner. Cf. Fletcher, D. S., 1966, Ent. Gazette 17: 9.
 regel 15 van boven: *Sciapteron tabaniformis* moet zijn: *Paranthrene tabaniformis*.

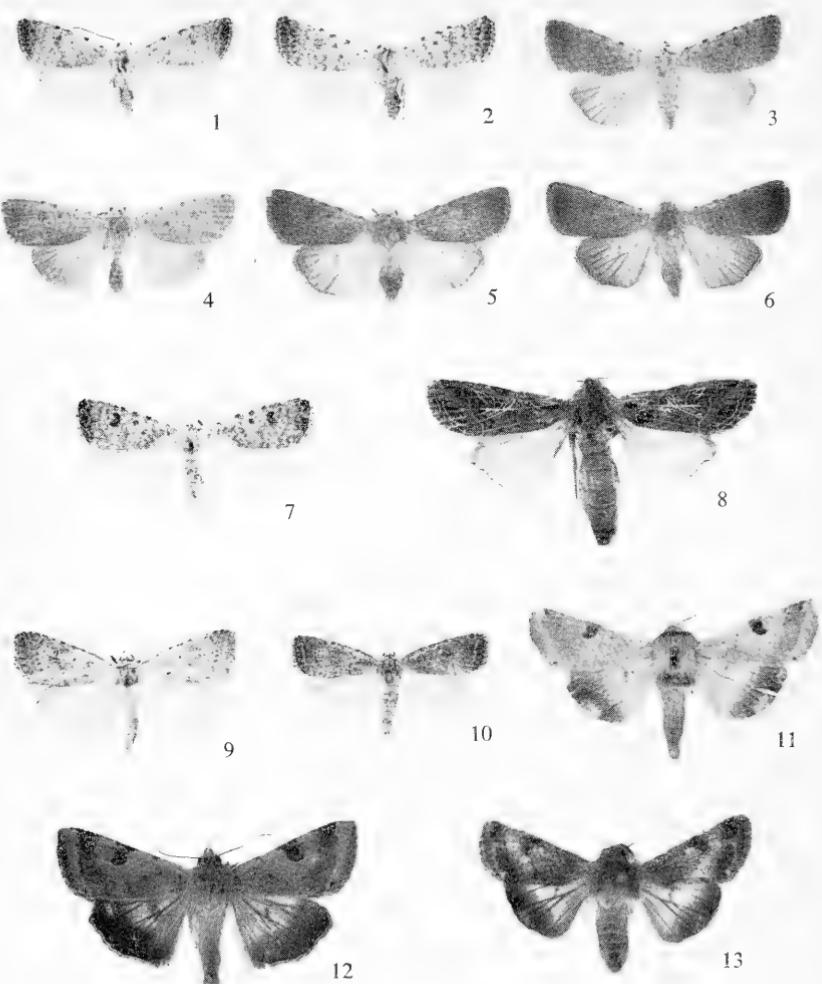
Supplement XII

p. (812), regel 21 van boven: Hendrik-Ido-Ambacht moet vervallen.
 p. (841), regel 11 van onderen: Arkel moet vervallen.
 p. (837), regel 24 van onderen: *Photeres* moet zijn *Photedes*.
 plaat 15, regel 3 van boven: *Arenostola* moet zijn *Photedes*.



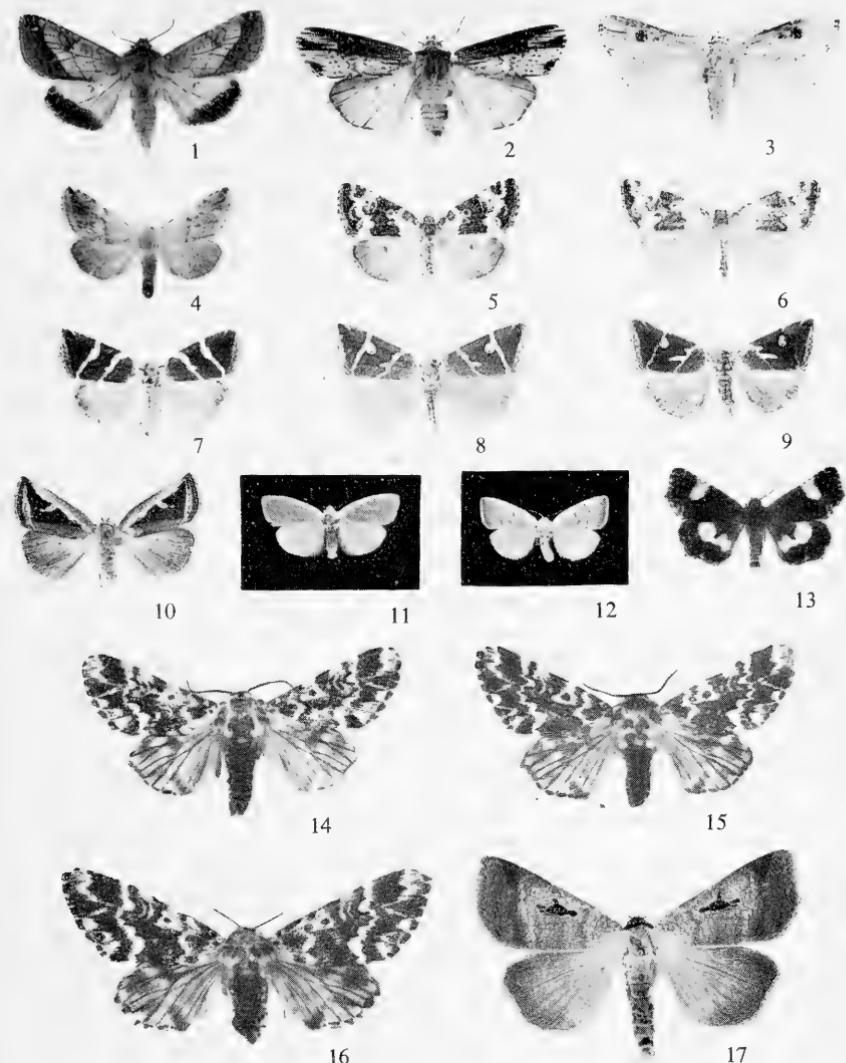
J. HUISENKA

Fig. 1—4. *Charanica trigammica* Hufnagel. 1. f. *semifuscans* Haworth, ♀, Den Haag, 18.VI.1949; 2. f. *fuscolimbata* nov., ♂, Twello, 2.VI.1938 (holotype); 3. f. *paradoxa* nov., ♂, Stein, 29.V.1960 (holotype); 4. f. *fasciata* Krombach, ♂, Heemstede, 20.V.1957. Fig. 5—7. *Hoplodrina alsines* Brahm. 5. f. *bimaculata* nov., ♂, Zeist, 8.VII.1949 (holotype); 6. f. *centrifasciata* nov., ♂, Slijk-Ewijk, 13.VI.1960 (holotype); 7. f. *clausa* Lempke, ♂, Twello, 8.VII.1930 (holotype). Fig. 8—10. *Hoplodrina blanda* Schiff. 8. f. *suffusa* Prout, ♂, Slijk-Ewijk, 7.VII.1960; 9. f. *pallidior* Lenz, ♂, Slijk-Ewijk, 1.VIII.1961; 10. f. *bimaculata* nov., ♂, Lelystad, 1.VII.1961 (holotype). Fig. 11. *Hoplodrina ambigua* Schiff, f. *obscura* nov., ♀, Slijk-Ewijk, 13.VII.1960 (holotype).



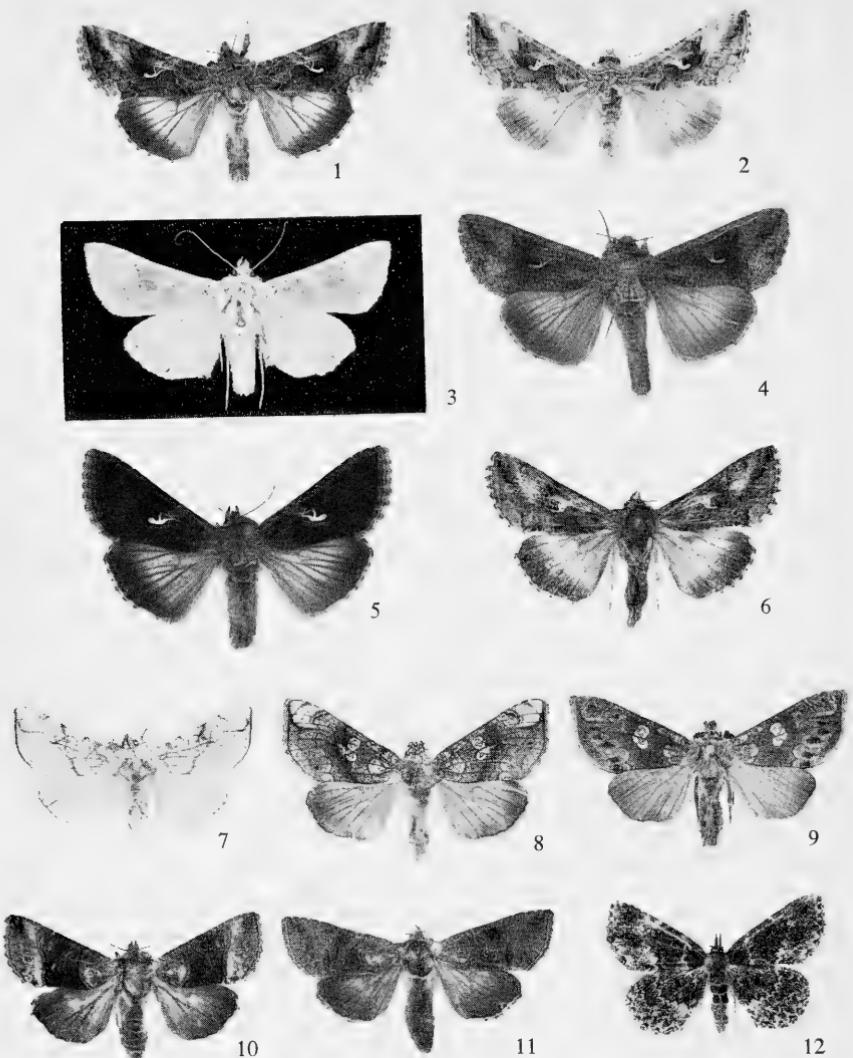
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Fig. 1—3. *Caradrina selini selini* Boisduval. 1. ♂, Colmars-les-Alpes (Basses Alpes, France), 7.VII.1929. 2. ♂, Larche (Basses Alpes, France), 1—6.VIII.1932. 3. ♀, Colmars-les-Alpes, 2.VII.1929. Fig. 4—6. *Caradrina selini milleri* Schultz. 4. ♂, Haarlem, 6.VI.1930; 5. ♂, Venlo, 12.VI.1937; 6. ♀, Wassenaar, 20.VI.1939. Fig. 7. *Caradrina clavipalpis* Scopoli, f. *bimaculata* nov., ♂, Wageningen, 2.VII.1953 (holotype). Fig. 8. *Spodoptera littoralis* Boisduval, ♀, Alkmaar, 22.XI.1922, e. 1. Fig. 9, 10. *Athetis gluteosa* Treitschke. 9. ♂, Epen, 18.VII.1955; 10. ♀, Epen, 24.VII.1954. Fig. 11—13. *Chlortidea peltigera* Schiff. 11. ♂, Beemster, 15.V.1958; 12. f. *condolens* Schawerda, ♂, Bunde, 27.VIII.1964; 13. f. *obscura* nov., Hoorn, ♂, 20.VIII.1958 (holotype).



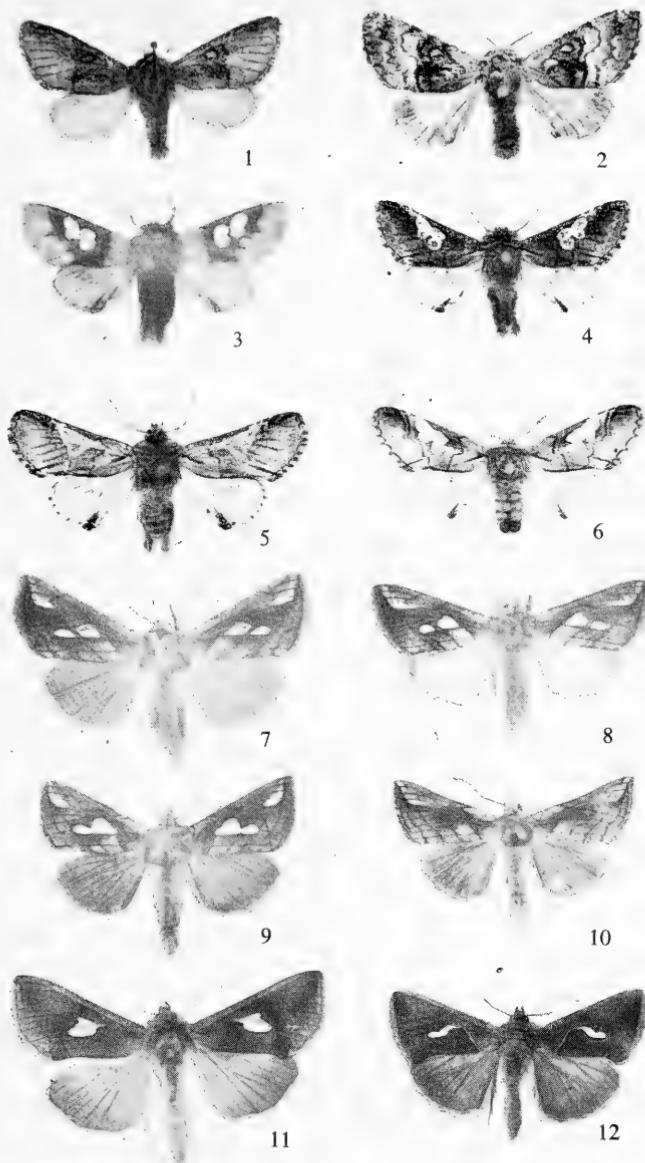
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Fig. 1. *Pyrrhia umbra* Hufnagel, f. *postclara* nov., ♂, Valkenisse, 7.VII.1963 (holotype). Fig. 2, 3. *Axylia putris* L. 2. f. *obscura* nov., ♂, Halfweg, 22.VI.1961 (holotype); 3. f. *clara* nov., ♂, Heer, 21.VII.1954. Fig. 4. *Porphyria parva* Hübner, ♂, Cadier, 28.VIII.1964 ($\times 1\frac{1}{2}$). Fig. 5, 6. *Jaspidea deceptoria* Schiff. 5. ♂, Cadier, 3.VI.1960; 6. f. *latefasciata* nov., ♂, Simpelveld, VI.1954 (holotype). Fig. 7—9. *Eustrotia bankiana* Fabricius. 7. ♀, Empe, 1.VII.1954; 8. f. *renigera* nov., ♂, Slijk-Ewijk, 19.V.1960 (holotype); 9. f. *renigera* nov. + f. *obsoleta* Tutt, ♀, Winterswijk, 15.VI.1958. Fig. 10. *Eustrotia uncula* Clerck, f. *bipartita* nov., ♀, Hendrik-Ido-Ambacht, 9.VII.1959 (holotype). Fig. 11. *Earias clorana* L., ♂, Halfweg, 7.VIII.1960. Fig. 12. *Earias vernana* Fabricius, ♂, Donderen, 5.VI.1954. Fig. 13. *Acontia luctuosa* Schiff., ♂, Heemskerk, 22.VII.1963. Fig. 14—16. *Panthea coenobita* Esper. 14. ♂, Schoonlo, 25.VI.1963; 15. ♂, Schoonlo, 27.VI.1963; 16. ♀, Schoonlo, 25.VI.1963. Fig. 17. *Lygephila pastinum* Treitschke, f. *confluens* nov., ♂, Aalten, 2.VII. 1952 (holotype).



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Fig. 1, 2. *Colocasia coryli* L. 1. f. *melanotica* Haverkampf, ♂, Swalmen, 9.V.1954; 2. f. *trilinea* nov., ♂, Eext, 11.V.1963 (holotype). Fig. 3—6. *Diloba caeruleocephala* L. 3. f. *medianigra* van Wisselingh, ♂, Epen, 1.X.1965 (holotype); 4. f. *nigrescens* nov., ♂, Heemskerk, 9.X.1961 (holotype); 5. f. *confluens* Dammer + f. *protensa* Lempke, ♂, Aerdenhout, 12.X.1948; 6. f. *protensa* Lempke, ♀, Hoog-Keppel, 22.IX.1956, e. l. Fig. 7, 8. *Autographa festucae* L. 7. f. *obscura* nov., ♀, Halfweg, 23.VI.1962 (holotype); 8. f. *alepica* nov., ♂, Halweg, 8.VIII.1959 (holotype). Fig. 9, 10. *Autographa gracilis* Lempke. 9. f. *coalescens* nov., ♂, Nijetrijne, 21.VI.1964 (holotype); 10. f. *disconulla* nov., ♂, Griendseveen, 21.VI.1964 (holotype). Fig. 11. *Autographa bractea* Schiff., ♂, Helenaveen, 4.VII.1963. Fig. 12. *Macdunnoughia confusa* Stephens, ♂, Helenaveen, 9.VIII.1963.



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Fig. 1—6. *Autographa gamma* L. 1. ♂, Borgercompagnie, 6.XI.1962; 2. f. *pallida* Tutt, ♂, Apeldoorn, 17.IX.1958; 3. f. *alba* Cockayne, ♂, Epen, 2.IX.1958; 4. f. *fuscescens* Goodson, ♂, Apeldoorn, 20.IX.1953; 5. f. *nigricans* Spuler, ♂, Hendrik-Ido-Ambacht, 20.VIII.1962; 6. f. *microgamma* nov., ♂, Marknesse, 21.VI.1951 (holotype). Fig. 7—9. *Polychrisia moneta* Fabricius. 7. f. *pallescens* Lempke, ♂, Aerdenhout, 25.VI.1960; 8. f. *obscura* nov., ♂, Halfweg, 11.IX.1963 (holotype); 9. f. *maculata* Lempke, ♂, Apeldoorn, 2.VII.1901, e. l. (holotype). Fig. 10, 11. *Abrostola triplasia* L. 10. ♂, Heemskerk, 21.V.1961; 11. f. *plumbea* Cockayne, ♀, Gronsveld, 22.VII.1959. Fig. 12. *Parascotia fuliginaria* L., f. *variegata* Lempke, ♀, Aerle-Rixtel, 21.VII.1961.

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* Een sterretje duidt een naam aan nieuw voor de wetenschap.

* An asterisc denotes a name new to science.

In dit register zijn weggelaten de namen van taxa onder de rang van subspecies, behalve die welke als nieuw worden beschreven.

From this Index are omitted names of taxa lower than subspecies, except those being described as new.

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